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OIL AND GAS DEVELOPMENTS IN PENNSYLVANIA IN 1977

Louis Heyman
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF
TOPOGRAPHIC AND GEOLOGIC SURVEY
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OIL AND GAS DEVELOPMENTS IN PENNSYLVANIA IN 1977

by Louis Heyman and Cheryl L. Cozart
Pennsylvania Geological Survey

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ABSTRACT

In 1977, 678 oil wells were completed in Pennsylvania. This is an increase of 38 wells or 6 percent over 1976. A total of 694 gas wells were completed, an increase of 129 wells or 23 percent over 1976. Total wells completed were 1,462, an increase of 151 wells (12 percent) over 1976. Total footage drilled was 3,461,805, an increase of 18 percent over 1976 (2,930,367 feet).

Exploratory wells drilled to find and produce hydrocarbons in unproved areas increased from 74 wells comprising 289,118 feet of hole in 1976 to 93 wells comprising 348,926 feet of hole in 1977, an increase of 26 percent in wells and 21 percent in footage. There were 10 gas discoveries and no oil discoveries in 1977.

The three most active counties in oil drilling, where approximately 91 percent of all oil wells were drilled, were Venango, Warren, and Forest. Operations in McKean County lagged due to a great decrease in activity in the Bradford oil field. In gas operations, the six most active counties, where approximately 87 percent of all gas wells were drilled, were Indiana, Westmoreland, Jefferson, Clearfield, Washington, and Armstrong.

Seismic exploration activity increased from 9.2 crew-months in 1976 to 17.99 crew-months in 1977. The focus of seismic activity shifted south and east of former areas of interest to the counties of the Allegheny Front and western Valley and Ridge.

Oil reserves decreased from 50,563,000 barrels in 1976 to 49,334,000 barrels in 1977, a 2 percent drop. Gas reserves increased from 1,651,898 million cubic feet in 1976 to 1,884,932 million cubic feet in 1977, up 14 percent. Oil production in 1977 totaled 2,659,000 barrels, 10 percent below the 2,950,000 barrels produced in 1976. Gas production rose to 92,293 million cubic feet in 1977 from 89,974 million cubic feet in 1976, a 3 percent increase.

The price of Penn Grade crude oil was $13.82 per barrel until July 31, 1977; from August 1 to December 31 it was $14.77 per barrel. The wellhead price paid for natural gas during the year ranged from $0.30 per thousand cubic feet under old contracts to as high as $1.733 per thousand cubic feet in new intrastate contracts.

Projects in progress at the Oil and Gas Geology Division of the Bureau of Topographic and Geologic Survey include: subsurface stratigraphy and hydrocarbon potential of the Devonian organic-rich shales of Pennsylvania; map of the subcrop beneath the Onondaga-Huntersville-Bois Blanc

Formations in the subsurface of Pennsylvania; Lower Devonian Ridgeley Formation in the subsurface of Pennsylvania; subsurface structure of the Plateau region of north-central and western Pennsylvania; oil and gas quadrangle base map preparation.

INTRODUCTION

Pennsylvania oil and gas statistics reported here are based on drillers' records and location plats filed with the Oil and Gas Division of the Bureau of Land Protection and Reclamation, the administrative and regulatory agency for the oil and gas laws. The only wells reported are those for which records and plats have been received within the year. This includes wells drilled in prior years for which records were submitted and received in 1977. It does not include 1977 wells for which records had not been submitted within the year. Oil production and reserves data and gas production and reserves data shown in Figures 1 through 5 were obtained from the American Petroleum Institute and the American Gas Association, respectively.

ACKNOWLEDGEMENTS

We appreciate the cooperation of the Oil and Gas Division of the Bureau of Land Protection and Reclamation, Pennsylvania Department of Environmental Resources, in sharing drillers' logs submitted to them by the operators under the oil and gas law.

We also appreciate the help of the Pennsylvania Grade Crude Oil Association; the Pennsylvania Oil, Gas and Minerals Association; the Pennsylvania Game Commission; the American Gas Association; the American Petroleum Institute; Petroleum Information Corporation; the Division of Minerals of the Bureau of Forestry, Pennsylvania Department of Environmental Resources; and the Bureau of Statistics, Pennsylvania Department of Commerce.

Thanks are extended to all operators and companies who released natural gas production statistics and other data.

PRODUCTION AND RESERVES

OIL PRODUCTION

In 1977, a total of 2,659,000 barrels (bbl.) of oil, worth approximately \$38,010,405, was produced from Upper Devonian and Silurian sandstones, compared to 2,950,000 bbl. of oil in 1976 worth \$35,861,335. Included in that total is the production of crude oil formerly designated "Corning Grade" from Medina (Lower Silurian) sandstones in Erie and Crawford Counties amounting to 37,405 bbl., down 25,595 bbl. from 1976. All oil produced in Pennsylvania is now designated Penn Grade Crude. Production of natural gas liquids fell 19 percent in 1977 (Figure 1).

Figure 1. Oil production in Pennsylvania, 1977

	1977	*1976*	*% Change*	*Cumulative to 12/31/77*
	(1,000 barrels)			
Penn Grade	2,659	2,950	-10	1,292,223
Natural gas liquids	56	69	-19	--

Figure 2 shows the amount of oil production by county and total number of producing wells. The total oil production in the two figures differs because Figure 1 is based on actual oil produced whereas Figure 2 is based on oil shipped or sold. The leading counties for oil production in 1977 were McKean, Venango, and Warren Counties, which together produced approximately 87 percent of the total oil produced in Pennsylvania.

Figure 2. Oil wells and crude oil produced in Pennsylvania in 1976 and 1977, by counties*

County	*Crude oil production (barrels)*		*Number of producing oil wells*	
	1977	*1976*	*12/31/77*	*12/31/76*
Allegheny........	47,162	53,427	310	345
Armstrong........	9,759	10,724	104	110
Beaver...........	4,869	4,970	93	105
Butler...........	73,404	75,854	1,378	1,341
Clarion..........	32,516	26,096	554	501
Crawford.........	43,541	65,645	70	72
Elk..............	19,150	22,826	143	213
Erie.............	237	296	4	4
Fayette..........	50	109	2	2
Forest...........	122,810	117,662	888	937
Greene...........	28,611	30,571	299	277
Indiana..........	484	136	1	1
Jefferson........	3,614	3,188	29	109
McKean...........	1,198,616	1,302,034	12,734	13,271
Mercer...........	1,283	1,059	106	87
Potter...........	13,984	15,380	78	196
Venango..........	577,474	586,232	6,924	6,732
Warren...........	438,785	465,154	4,105	3,972
Washington.......	87,414	90,322	578	531
Total........	2,703,763	2,871,685	28,400	28,806

*Compiled by the Pennsylvania Department of Commerce, Bureau of Statistics

OIL RESERVES

Total net proved reserves of oil in the commonwealth at the end of 1977 decreased 2 percent from 1976. Counties with the greatest reserves were McKean, Venango, and Warren. Warren County had a net increase in reserves, while in the rest of the counties production exceeded new reserves added. Reserves of natural gas liquids fell 13 percent. Figure 3 summarizes proved reserves in 1977 and 1976.

Figure 3. Oil reserves in Pennsylvania, 1977

	1977	*1976*	*% Change*
		(1,000 barrels)	
Total oil	49,334	50,563	- 2
Natural gas liquids	390	446	-13

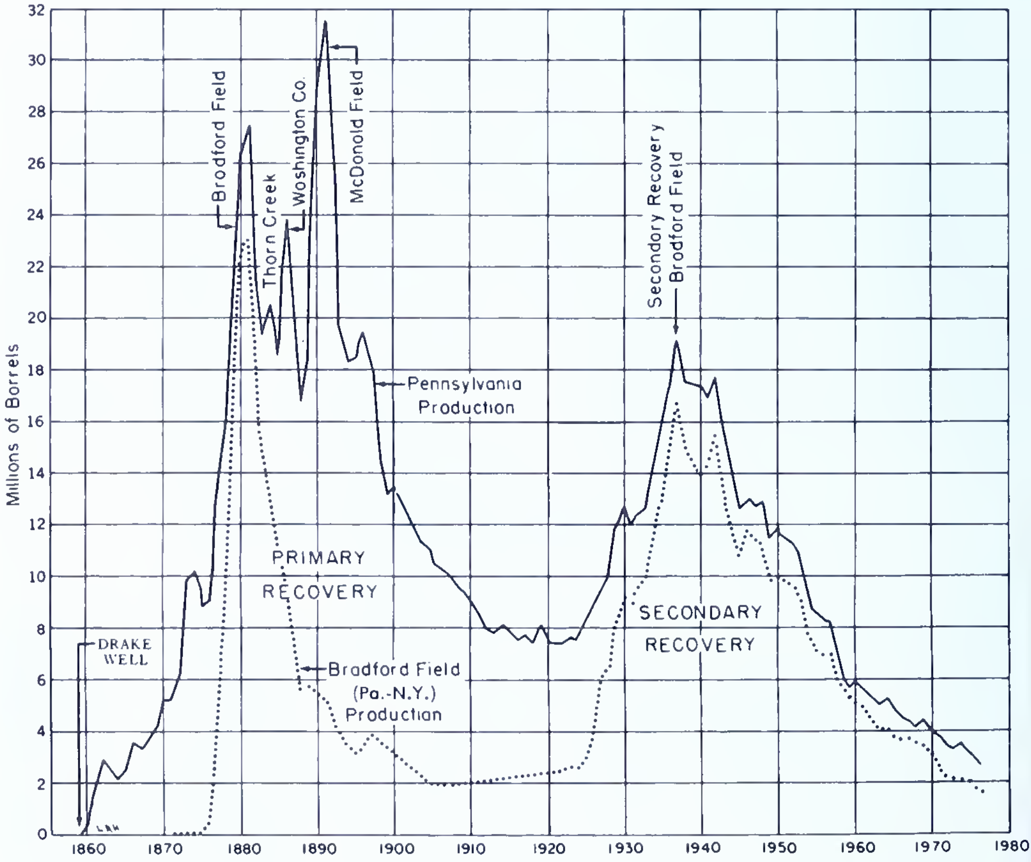


Figure 4. Annual production of crude oil in Pennsylvania

SECONDARY AND TERTIARY OIL RECOVERY PROJECTS

Only 8 service (water or gas injection) wells were drilled in 1977, compared to 49 in 1976. This is due to a very nearly 50 percent drop in all well completions in McKean County, from 116 in 1976 to 61 in 1977, which reflects the almost complete halt in development and waterflood drilling in the Bradford field in McKean County. Waterflood production in the Bradford field was about 42 percent of total statewide oil production. Figure 4 shows how much of Pennsylvania's previous production was due to secondary (waterflood) recovery.

No new waterflood projects were undertaken in 1977. The Penngrade Micellar Displacement Project at Derrick City, a joint effort of Pennzoil, Witco, Quaker State, and the U. S. Department of Energy for tertiary oil recovery from the Bradford field, is reported to be progressing satisfactorily. Injection of the micellar solution was begun in 1977. The project consists of 24 acres containing 16 input and 25 producing wells on 1.5-acre spacing; the reservoir is the Bradford Third Sandstone. The experimental Maraflood project in the tight Bradford Sandstone in the Bradford field at Cyclone, jointly sponsored by Pennzoil and Witco, is in a late stage and water injection is continuing.

GAS PRODUCTION

Gas production in 1977 rose three percent over 1976 — 92,293 million cubic feet as compared to 89,974 million cubic feet. Since there is a wide disparity between highest and lowest wellhead price for gas, no meaningful dollar value can be given without a breakdown by price categories.

The number of producing gas wells increased to approximately 17,900 at the end of 1977 from approximately 17,391 at the end of 1976. Leading

Figure 5. Gas production in Pennsylvania, 1977

	1977	*1976*	*% Change*	*Cumulative to 12/31/77*
	(millions of cubic feet)			
Shallow gas[1]	78,409	76,632	+2	--
Deep gas[2]	13,884	13,342	+4	--
Total gas	92,293	89,974	+3	9,105,853

[1] Shallow gas: from Upper Devonian or younger rocks, generally less than 4,000 feet deep.

[2] Deep gas: from Middle Devonian or older rocks, generally more than 4,000 feet deep.

counties both in gas production and new gas wells drilled were Indiana County, 290 new gas wells; Westmoreland County, 112 new wells; Jefferson County, 97 new wells; and Clearfield County, 41 new wells. Although drilling fell off markedly in Armstrong County, from 63 wells in 1976 to 23 in 1977, it remains a leading county in production. Figure 5 gives an overview of gas production for 1977 compared to 1976.

GAS RESERVES

The total proved recoverable reserve of natural gas rose 14 percent over 1976, and stored recoverable gas rose 8 percent (Figure 6). Figure 7 is a graph showing production, consumption, and reserves of natural gas in Pennsylvania.

Figure 6. Gas reserves in Pennsylvania, 1977

	1977	*1976*	*% Change*
	(millions of cubic feet)		
Total gas	1,884,932*	1,651,898*	+14
Stored recoverable gas	556,264	512,861	+ 8

*Includes stored recoverable gas

GAS STORAGE FIELDS

Gas storage fields have been created throughout Pennsylvania to accumulate gas during low-demand periods for use during high-demand periods.

In 1977, one new gas storage well was drilled to a depth of 1,790 feet in the Majorsville storage field (Figure 8) in Greene County. A new gas storage field (Vardy, Figure 8, no. 12) was placed in operation in 1977 in Butler County.

Storage capacity at the end of 1977 was 757,860 million cubic feet, an increase of 4,777 million cubic feet over 1976. Recoverable gas in storage in 1977 was 556,264 million cubic feet compared to 512,861 million cubic feet in 1976. The 556,000-million-cubic-foot value represents roughly two thirds of the total gas consumed in Pennsylvania in 1976 (713,579 million cubic feet).

OIL AND GAS PRICES

Practically all oil production in Pennsylvania is classified as stripper production (less than 10 barrels per well per day). The stripper price for Penn

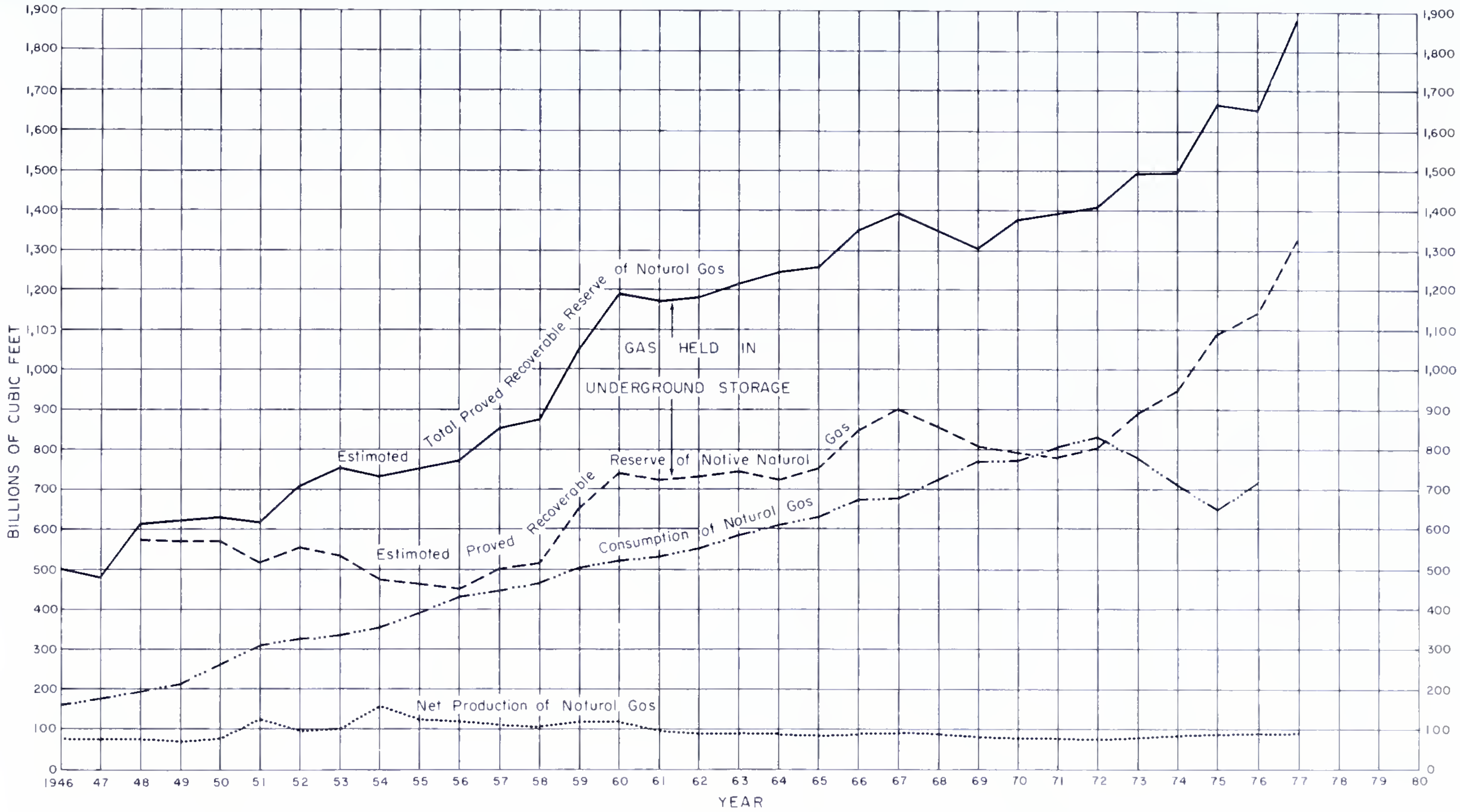


Figure 7. Production, consumption, and reserves of natural gas in Pennsylvania

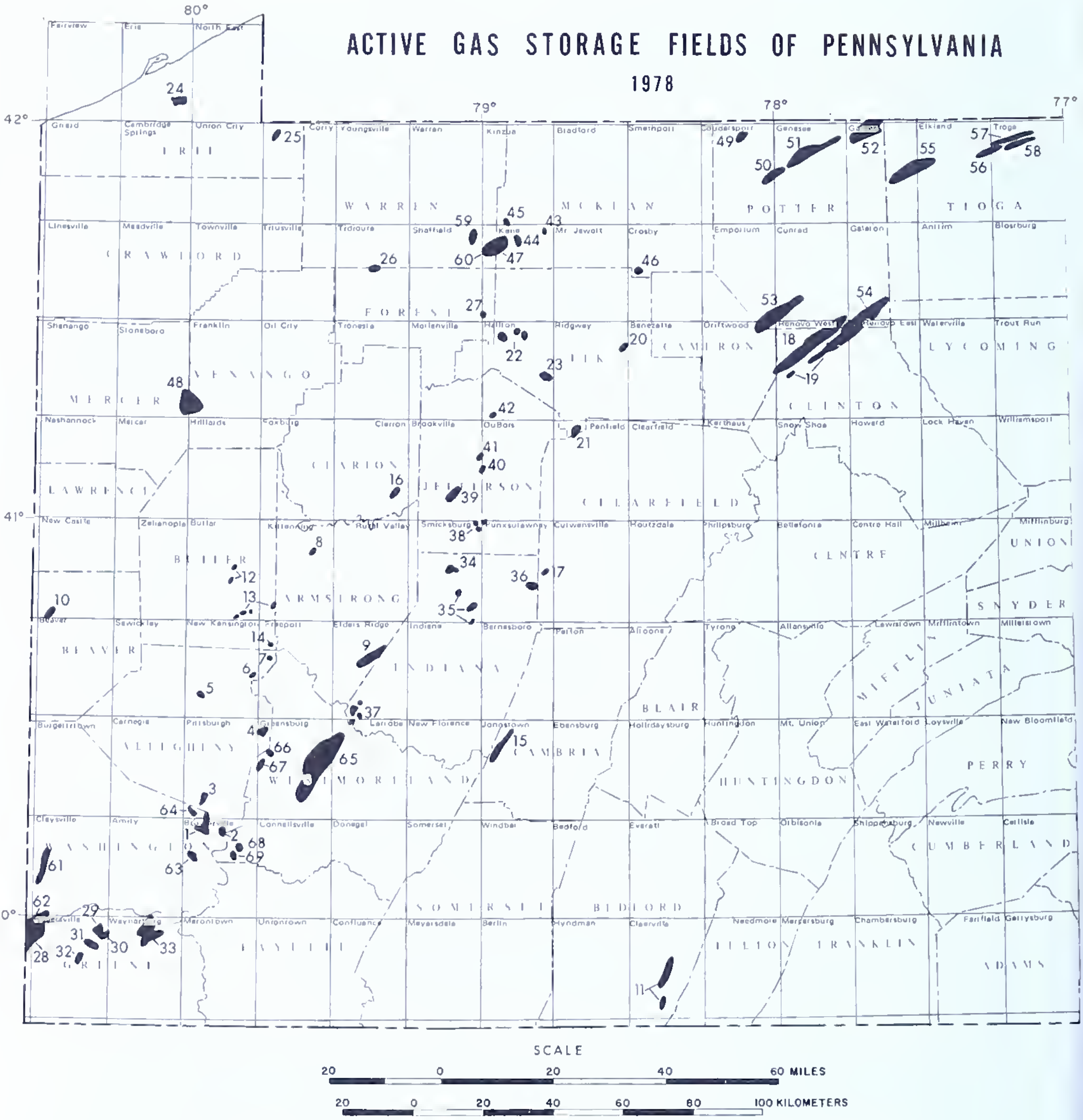


Figure 8. Active gas storage fields of Pennsylvania

NAMES OF ACTIVE GAS STORAGE FIELDS IN PENNSYLVANIA

(As shown on Figure 8)

ALLEGHENY COUNTY

1. Bunola
2. Gamble Hayden
3. Tepe
4. Murrysville
5. Mt. Royal
6. Tarentum
7. Smith Parke

ARMSTRONG COUNTY

8. Fair & Helm
9. South Bend

BEAVER COUNTY

10. Black Hawk

BEDFORD COUNTY

11. Artemas & Five Forks

BUTLER COUNTY

12. Portman & Vardy
13. Saxonburg
14. Hughes

CAMBRIA COUNTY

15. Rager Mountain

CLARION COUNTY

16. Truitsburg

CLEARFIELD COUNTY

17. Gourley-Miller

CLINTON COUNTY

18. Leidy
19. Tamarack

NAMES OF ACTIVE GAS STORAGE FIELDS IN PENNSYLVANIA

(*Continued*)

ELK COUNTY

20. St. Marys
21. Baone Mountain
22. Owls Nest
23. Belmauth

ERIE COUNTY

24. Summit
25. Carry

FOREST COUNTY

26. Queen
27. Duhring

GREENE COUNTY

28. Majarsville
29. Swarts West
30. Swarts
31. Hunters Cave
32. Halbraak
33. Pratt

INDIANA COUNTY

34. Alabran
35. Kinter
36. Clark
37. Schmidt

JEFFERSON COUNTY

38. Sprankle
39. Galbraith
40. Iawa
41. Markle
42. Munderf

MCKEAN COUNTY

43. Mead Run
44. Keelar
45. Swede Hill
46. Wellendarf
47. East Branch "B"

MERCER COUNTY

48. Hendersan

POTTER COUNTY

49. Sharan
50. Hebran
51. Ellisburg
52. Harrisan
53. Whartan
54. Greenlick

TIOGA COUNTY

55. Sabinsville
56. Palmer
57. Tioga
58. Meeker

WARREN COUNTY

59. Deerlick
60. East Branch "A"

WASHINGTON COUNTY

61. Danegal
62. Heard
63. Calvin
64. Finleyville

WESTMORELAND COUNTY

65. Oakford
66. Traffard
67. Irwin
68. Webster
69. Pattan

Grade was $13.82 per barrel until July 31, 1977; from August 1 to December 31, 1977, the price was $14.77 per barrel.

The wellhead price paid per thousand cubic feet for natural gas during the year ranged from $0.30 in old contracts to as high as $1.733 per thousand for new gas delivered as *intra*state gas. The wellhead price of *inter*state gas ranged up to $1.48 for new gas under Federal Power Commission opinion 770, amended by 770-A.

1977 DRILLING AND COMPLETIONS

TOTAL COMPLETIONS

The total number of all wells completed in Pennsylvania in 1977 was 1,462 wells, including 24 wells drilled deeper. This is an increase of 151 wells (12 percent) over 1976. The total footage drilled was 3,461,805 feet, an increase of 531,438 feet (18 percent) over 1976. The average depth per well was 2,368 feet. The five most active counties, in order of importance, were Indiana, Venango, Warren, Forest, and Westmoreland, which together contained approximately 70 percent of all wells drilled (Figure 9).

Figure 9. New well completions and old wells drilled deeper in Pennsylvania, 1977

NEW WELL COMPLETIONS

County	*No. of wells*	*Average total depth (feet)*
Allegheny	6	3,049
Armstrong	24	3,557
Beaver	1	7,519
Butler	5	1,962
Cambria	11	4,314
Cameron	1	6,608
Clarion	10	2,528
Clearfield	42	3,771
Crawford	15	2,754
Elk	8	3,218
Erie	24	2,790
Fayette	7	4,424
Forest	121	1,287
Indiana	294	3,700
Jefferson	99	3,456
Lycoming	5	4,916
McKean	61	1,763
Mercer	10	3,161
Potter	8	1,782
Schuylkill	2	2,149
Somerset	8	7,375
Venango	274	835
Warren	248	1,127
Washington	32	3,699
Westmoreland	122	3,762
Total	1,438	2,390

OLD WELLS DRILLED DEEPER

County	*No. of wells*	*Average amt. deepened (feet)*
Allegheny	1	476
Armstrong	4	923
Butler	3	818
Clarion	1	140
Elk	1	211
Fayette	1	1,162
Indiana	8	1,398
Jefferson	2	1,235
Venango	1	225
Westmoreland	2	1,774
Total	24	1,065

OIL COMPLETIONS

The total number of oil wells completed in Pennsylvania in 1977 was 678 wells, including 2 wells drilled deeper. This is an increase of 38 wells (6 percent) over 1976. The total footage drilled was 716,965 feet, an increase of 11,115 feet (16 percent) over 1976. The average depth per well was 1,057 feet. The most active counties, in order of importance, were Venango, Warren, and Forest, which together contained approximately 91 percent of all oil wells drilled (Figure 10).

Figure 10. New oil well completions and old oil wells drilled deeper in Pennsylvania, 1977

NEW OIL WELL COMPLETIONS

County	*No. of wells*	*Average initial production (bopd)**	*Average total depth (feet)*
Butler	3	2	1,400
Clarion	1	2	2,295
Crawford	2	3	671
Elk	1	**	2,672
Forest	108	13	1,185
McKean	53	5	1,760
Venango	264	16	792
Warren	244	36	1,127
Total	676	22	1,059

OLD OIL WELLS DRILLED DEEPER

County	*No. of wells*	*Average initial production (bopd)**	*Average total depth (feet)*
Butler	1	1	900
Venango	1	12	225
Total	2	7	563

*bopd = barrels of oil per day
**Production not given

GAS COMPLETIONS

The total number of gas wells completed in Pennsylvania in 1977 was 694 wells, including 20 wells drilled deeper. This is an increase of 129 wells (23 percent) over 1976. The total footage drilled was 2,484,261 feet, an increase of 514,888 feet (26 percent) over 1976. The average depth per well was 3,580 feet. The six most active counties, in order of importance, were Indiana, Westmoreland, Jefferson, Clearfield, Washington, and Armstrong, which together contained approximately 87 percent of all gas wells drilled (Figure 11).

Figure 11. New gas well completions and old gas wells drilled deeper in Pennsylvania, 1977

NEW GAS WELL COMPLETIONS

County	*No. of wells*	*Average initial open-flow (Mcfgpd)**	*Average total depth (feet)*
Allegheny................	5	527	3,315
Armstrong................	23	458	3,554
Butler...................	2	26	2,804
Cambria..................	7	535	3,834
Clarion..................	8	51	2,026
Clearfield...............	41	689	3,782
Crawford.................	6	394	4,072
Elk......................	2	67	2,455
Erie.....................	22	847	2,995
Fayette..................	6	248	3,800
Forest...................	3	275	2,716
Indiana..................	290	866	3,738
Jefferson................	97	444	3,463
Lycoming.................	2	401	6,382
McKean...................	1	475	1,874
Mercer...................	9	271	3,423
Potter...................	7	259	1,782
Somerset.................	2	1,275	8,981
Venango..................	1	134	1,043
Washington...............	28	547	3,852
Westmoreland.............	112	702	3,816
Total..................	674	691	3,650

OLD GAS WELLS DRILLED DEEPER

County	*No. of wells*	*Average initial open-flow (Mcfgpd)**	*Average amount deepened (feet)*
Allegheny................	1	150	476
Armstrong................	4	224	921
Butler...................	2	14	778
Fayette..................	1	10	1,162
Indiana..................	8	323	1,398
Jefferson................	2	963	1,235
Westmoreland.............	2	283	1,774
Total..................	20	308	1,204

*Mcfgpd = thousand cubic feet of gas per day

COMBINATION OIL AND GAS WELL COMPLETIONS

(not reported separately as oil or gas)

This classification refers to those wells that are primarily oil wells but also produce 100 thousand or more cubic feet of gas per day. Since most oil wells completed in Pennsylvania are drilled in partially depleted reservoirs, most produce only very small amounts of gas with the oil. Therefore, this category includes only a small number of wells. In 1977, 10 oil and gas wells were completed, whereas in 1976, 11 such wells were completed (Figure 12).

Figure 12. New combination oil and gas well completions in Pennsylvania, 1977

County	*No. of wells*	*Average initial open-flow (Mcfgpd)**	*Average initial production (bopd)***	*Average total depth (feet)*
Crawford........	3	100	20	4,214
Forest..........	5	156	24	2,215
Potter..........	1	83	60	1,780
Warren..........	1	300	5	1,964
Total.........	10	146	24	2,746

*Mcfgpd = thousand cubic feet of gas per day
**bopd = barrels of oil per day

DRY COMPLETIONS

The total number of dry holes drilled in Pennsylvania in 1977 was 72, including 2 old wells drilled deeper and completed dry. This is almost double the number (46) drilled in 1976, as are the comparative footages: 223,628 in 1977 compared to 145,419 in 1976. This reflects the greatly increased effort in exploratory drilling in 1977 over 1976 (93 wells drilled in 1977; 74 in 1976). Figure 13 shows the number of dry holes drilled and deepened in 1977.

MISCELLANEOUS COMPLETIONS

Comprised under this heading are stratigraphic or core tests, which are holes drilled basically for subsurface information; water input wells for secondary recovery by waterflood operations; air or gas injection wells for secondary oil recovery by air or gas drive; water supply wells for waterfloods; and liquid waste disposal wells. Fluctuations in this category are usually not significant as an indicator of general activity. In 1977, 8 miscellaneous wells were completed, compared to 49 in 1976 (Figure 14). This is largely due to cessation of waterflood developments.

Figure 13. New dry hole completions and old wells drilled deeper but completed dry in Pennsylvania, 1977

NEW DRY HOLE COMPLETIONS

County	*No. of dry holes*	*Average total depth (feet)*
Allegheny	1	1,715
Armstrong	1	3,633
Beaver	1	7,519
Cambria	4	5,154
Cameron	1	6,608
Clarion	1	6,780
Clearfield	1	3,337
Crawford	4	723
Elk	5	3,633
Erie	2	538
Fayette	1	8,168
Forest	4	1,820
Indiana	4	960
Jefferson	2	3,122
Lycoming	3	3,939
McKean	4	1,795
Mercer	1	800
Schuylkill	2	2,149
Somerset	6	6,840
Venango	9	2,068
Washington	3	3,348
Westmoreland	10	3,162
Total	70	3,190

OLD WELLS DRILLED DEEPER, COMPLETED DRY

County	*No. of dry holes*	*Average amt. deepened (feet)*
Clarion	1	140
Elk	1	211
Total	2	176

DRILLING AND PRODUCTION ACTIVITY

(classified as shallow or deep)

Drilling and production in Pennsylvania is classified by the Pennsylvania Geological Survey as follows: (1) shallow, based on reservoirs in rock formations of Pennsylvanian, Mississippian, and Upper Devonian age, generally less than 4,000 feet deep, and (2) deep reservoirs, in rock formations of Middle Devonian or older age, generally over 4,000 feet deep.

Figure 14. Service well completions in Pennsylvania, 1977

County	No. of wells	Average total depth (feet)
Forest	1	1,261
McKean	3	1,740
Warren	3	850
Washington*	1	456
Total	8	1,187

*Stratigraphic core test

The shallow reservoirs generally produce both oil and gas; the deep almost entirely gas. Figure 15 is a graph showing the shallow well activity from 1950-1977.

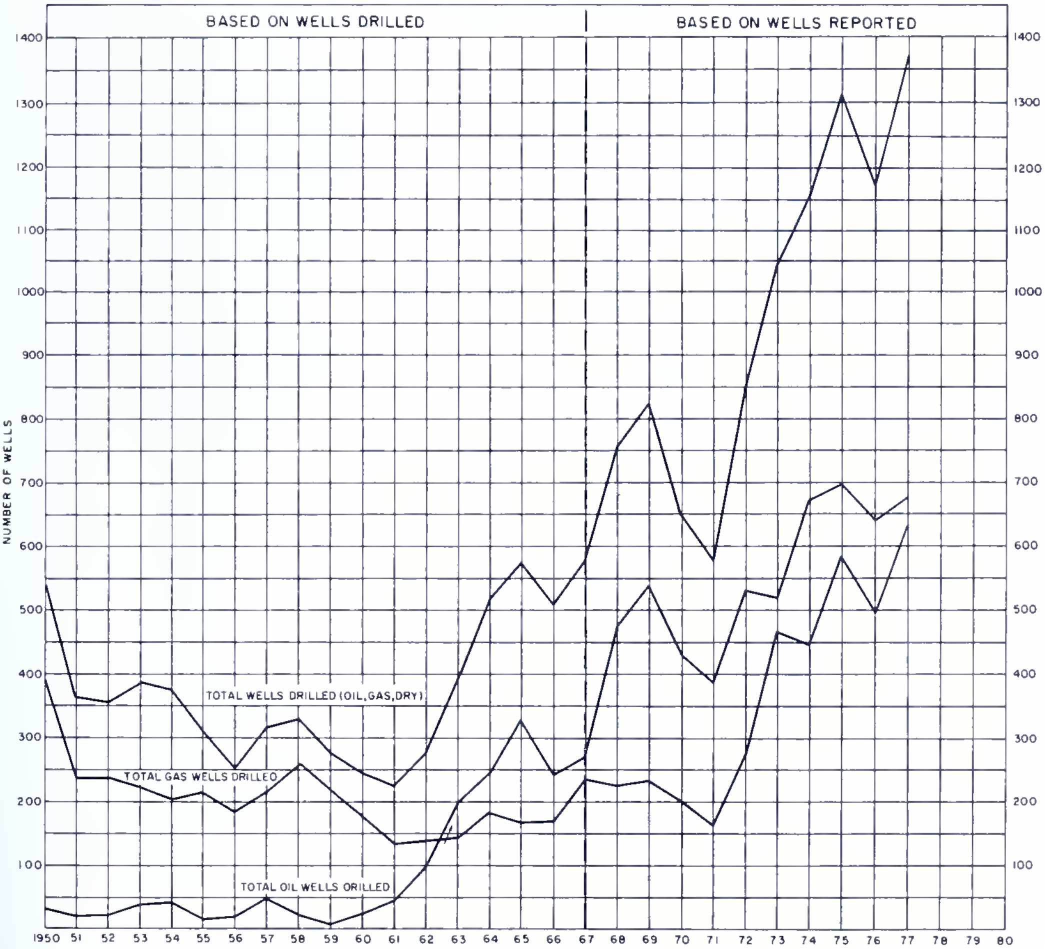


Figure 15. Shallow well activity, 1950-1977
(Upper Devonian or younger; generally less than 4,000 feet)

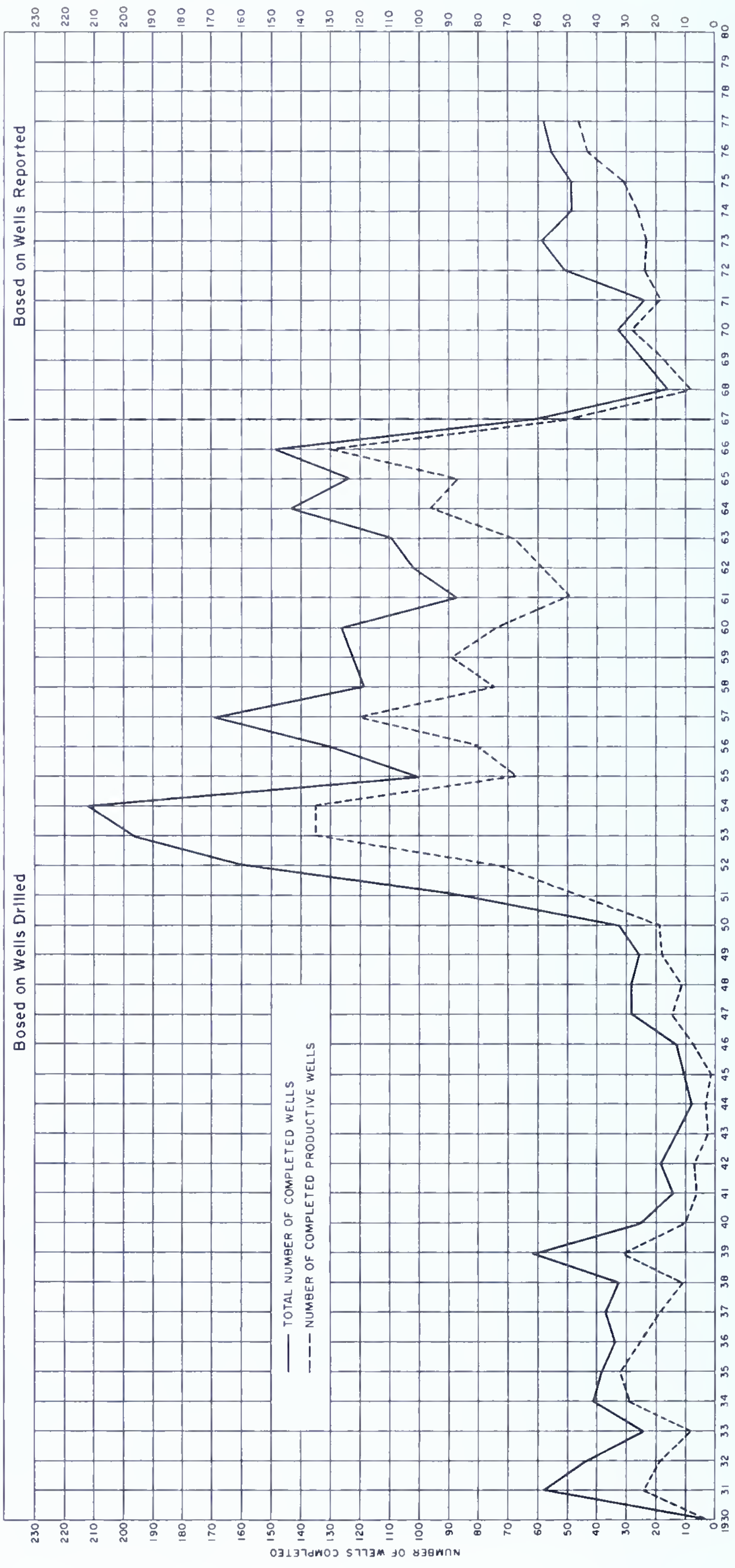


Figure 16. Annual rate of deep sand exploration and development, 1930-1977 (Middle Devonian or older producing horizons; generally more than 4,000 feet)

The Medina (Lower Silurian) Sandstones of Erie and Crawford Counties are usually less than 4,000 feet deep. They produce a small amount of oil with the gas and are regarded as deep horizons due to their geologic age. This exception is restricted to the northwest corner of the commonwealth.

Deep drilling was up from 56 wells in 1976 to 58 wells in 1977. Erie County was the most active deep drilling area with 22 such wells drilled; all were gas wells. Figure 16 is a graph showing the annual rate of deep exploration and development from 1930-1977.

The drilling depth record established by the Amoco #1 Svetz, drilled in Somerset County in 1974 to 21,460 feet, is still the deepest penetration in the Appalachian Basin. Figure 17 shows 1977 well completions divided into Upper Devonian and younger, and Middle Devonian and older wells.

Figure 17. Drilling and completion of wells reported, 1977 (according to geologic age and depth of producing horizons)

Shallow - Upper Devonian and younger	
NEW WELLS	
Gas	631
Oil	676
Oil and gas	7
Dry	58
Total	*1,372*
DEEPENED WELLS	
Gas	20
Oil	2
Dry	2
Total	*24*
MISCELLANEOUS WELLS	
Service and stratigraphic	*8*
Deep - Middle Devonian and older	
NEW WELLS	
Gas	43
Oil and gas	3
Dry	12
Total	*58*
TOTAL ALL WELLS DRILLED	*1,462*

A total of 13,884 million cubic feet of gas and 37,405 barrels of oil was produced from deep reservoirs in 1977. A summary by field and pool of deep gas production in 1977 and the cumulative production from these reservoirs is given in Figure 19. The producing depth record still stands at 11,458 feet from the Tuscarora (Lower Silurian) Sandstone in Summit field, Fayette County.

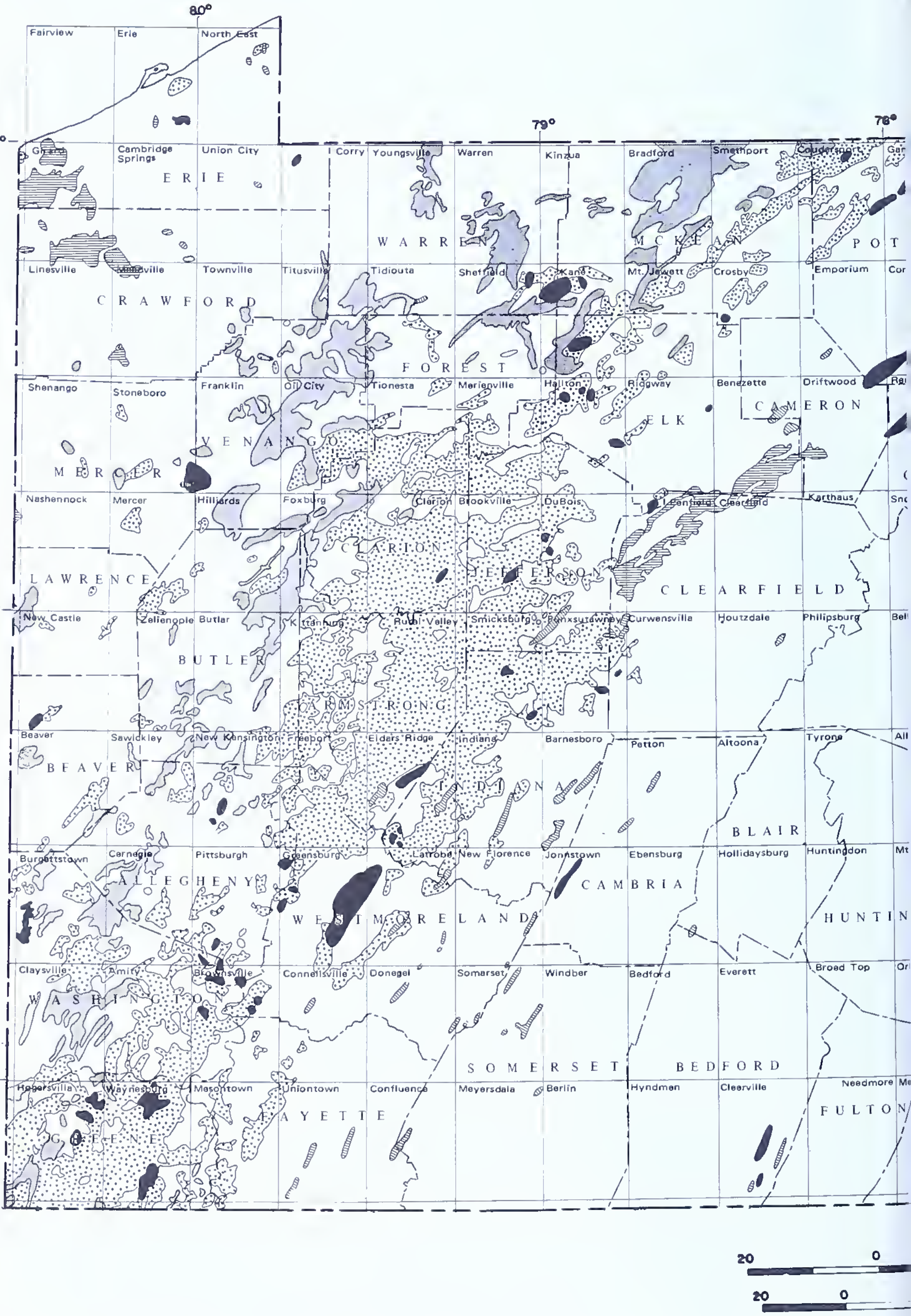
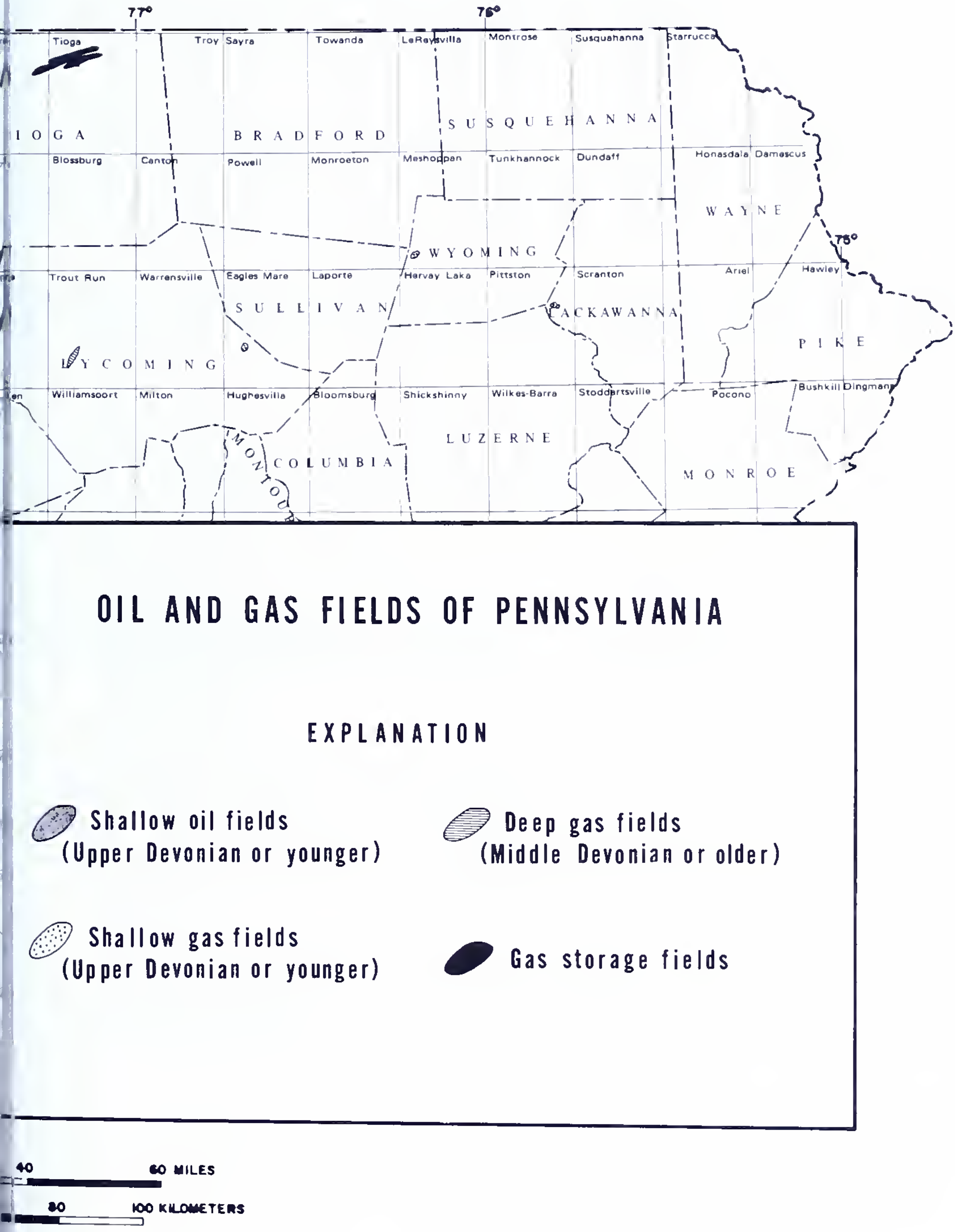


Figure 18. Oil a



of Pennsylvania

Figure 19. Gas production from rocks of Middle Devonian or older age in Pennsylvania, 1977

County	Field	Pool	Discovery date	Cumulative production at end of 1976 (in Mcf*)	Production 1977 (in Mcf*)	Cumulative production at end of 1977 (in Mcf*)	Status of field or pool at end of 1977
Armstrong	Goheenville**	Snyderville	10/23/70	214,280	20,310	234,590	Producing
	Roaring Run**	Roaring Run Oriskany	12/14/70	5,013,923	643,037	5,656,960	Producing
Beaver	Darlington		2/ 6/75		406	406	Abandoned
Cambria	Patton	Burley	1/15/69	224,836	9,471	234,307	Producing
		Pindleton	6/30/69	4,156,645	116,181	4,272,326	Producing
Cameron	Canoe Run		8/24/73	214	655	869	Producing
	East Emporium		11/18/71	2,554,555	411,959	2,966,514	Producing
Cameron & Elk	Whippoorwill		7/10/61	15,449,070	103,385	15,552,455	Producing
Cameron, Elk, Jefferson, Clearfield and Indiana	Punxsutawney-** Driftwood	*TOTAL*	9/15/51	485,673,928	1,884,264	487,558,192	Producing
		Benezette	1/ 5/53	248,104,584	650,104	248,754,688	Producing
		Driftwood	9/15/51				
		Boone Mt.	9/18/53	104,491,326	564,588	105,055,914	Producing
		DuBois	1/ 6/60				
		Sabula	8/26/63	936,278	35,934	972,212	Producing
		Helvetia	5/11/60	127,891,396	599,091	128,490,487	Producing
		Reed-Deemer	5/ 9/55				
			12/ 1/53				
		Rockton	2/25/55				
		Sykesville	11/10/60				
		Hicks Run	6/ 7/56	4,250,344	34,547	4,284,891	Producing
Clearfield	Beech Run	Anderson Creek	9/25/75		42,798	42,798	Producing
	Boone Mt.	Moshannon	9/15/76		14,347	14,347	Producing
	West Decatur		3/30/73	1,478,144	360,052	1,838,196	Producing & shut-in
Clinton & Potter	Leidy	*TOTAL*	1/ 9/50	160,238,156	34,660	160,272,816	Gas storage & producing
		Ole Bull	1/ 9/59	5,438,124	34,660	5,472,784	Producing
Crawford	Athens		9/20/74				Shut-in
	Cambridge Springs		1/31/76	39,043	35,828	74,871	Producing
	Geneva	Greenwood	10/31/73				Shut-in
	Sparta	Eastman Hill	10/30/75				Shut-in
Crawford & Erie	Conneaut	*TOTAL*	2/11/57	36,526,308	1,275,238	37,802,096	Producing & abandoned
		Bushnell-Lexington	12/31/58	15,812,930	548,538	16,361,468	Producing & abandoned

		Indian Springs	9/11/57	14,076,975	563,208	14,640,183	Producing
		Kastle	7/14/62	3,216,491			Shut-in
		Lundys Lane	11/ 9/61	2,210,964	138,824	2,349,788	Producing
		Pierce	12/31/58	830,455	15,161	845,616	Producing
		West Mead	7/ 8/74		9,557	9,557	Producing
Elk..................	Benzinger		11/ 7/72				Shut-in
	Horton	Boot Jack	9/20/73	9,250	2,025	11,275	Producing
Erie..................	Alder Run		10/30/75				Shut-in
	Bull Reservoir		9/17/72	4,107	14,840	18,947	Producing
	Burgess		10/17/60	161,544	5,897	167,441	Producing
	Charter Oaks		5/19/77		2,640	2,640	Producing
	Corry	*TOTAL*	4/29/47	1,061,821	273	1,062,094	Gas storage & producing
		Beaver Oam	5/20/53	208,121	273	208,394	Producing
	Erie Deep		3/21/77		2,880	2,880	Producing & shut-in
	Fairview		3/12/77		35	35	Producing
	Glenwood		8/ 9/77		3,548	3,548	Producing
	McKean		1/19/73	134,869	397	135,266	Producing
	Northeast	Orchard Beach	2/ 8/74	13,500	21,515	35,015	Producing & shut-in
Fayette..............	Highhouse	Woodside	3/10/75				Shut-in
	Ohiopyle		12/28/59	4,271,222	54,215	4,325,437	Producing
	Sandy Creek**		8/ 8/63				Shut-in
		Fike	8/ 8/63				Shut-in
		Quebec Run	6/31/69				Shut-in
	Spruell		10/31/61	5,168,905	578,198	5,747,103	Producing
	Summit	*TOTAL*	3/24/38	43,483,584	278,750	43,762,334	Producing & abandoned
		North Summit	3/24/38	21,404,651	62,936	21,467,587	Producing
		South Summit	5/ 9/42	22,051,783	215,814	22,267,597	Producing
Indiana..............	Cherry Hill**	Crichton	1/ 9/63	2,943,771	28,017	2,971,788	Producing
			7/11/63				
	Jacksonville		9/21/56	29,192,010***	243,091	29,435,101	Producing
	Nolo		9/30/56	13,682,997	53,371	13,736,368	Producing
	Strongstown	Lizowitz	6/19/54		52,417	6,791,082	Partial 1977 production
		Pineton	12/20/69	5,362,097	993,264	6,355,361	Preliminary figure
Jefferson............	Big Run**	Elk Run	6/30/65	47,146,399	399,268	47,545,667	Producing
Lycoming.............	Salladasburg		6/24/76				Shut-in
McKean...............	Bradford	Cyclone	2/18/74	489,013	159,963	648,976	Producing
		Minard Run	1/10/75				Production not available
	Corydon		9/ 8/72				Shut-in
Mercer...............	Henderson	Kilgore	10/26/66				Production not available
	Sheakleyville	Fleck	8/27/75				Shut-in
	Wheatland		7/24/63	222,740	16,494	239,234	Producing & shut-in
Potter...............	Ulysses		10/ 2/39	4,067,771	96,408	4,164,179	Producing
		Newfield	4/ 2/63				

Figure 19. (Continued)

County	Field	Pool	Discovery date	Cumulative production at end of 1976 (in Mcf*)	Production 1977 (in Mcf*)	Cumulative production at end of 1977 (in Mcf*)	Status of field or pool at end of 1977
Somerset.............	Boswell	*TOTAL*	11/11/58	11,699,720	221,020	11,920,740	Producing
		Boswell	11/11/58	10,702,440	197,560	10,900,000	Producing
		Edie	10/18/68		4,246	4,246	Producing
		Snyder	6/16/60	997,280	23,460	1,020,740	Producing
	Heckman Hollow		8/16/77				Shut-in
	Shade Creek		10/ 3/77				Shut-in
	Shanksville		9/22/73				Shut-in
Venango..............	Barkeyville	Duncan	4/ 5/73	88,478	14,202	102,680	Producing
	Franklin-Oak						
	Forest	Galloway	11/12/73	34,752	4,315	39,067	Producing
	Wesley	Irwin	12/ 1/72	147,255	41,080	188,335	Producing
Warren................	Sugar Grove	Pettigrew	5/29/70				Shut-in
	Whites Run		10/30/75				Shut-in
Washington...........	Daniels Run**	Glyde	9/ 6/61	121,093	5,574	126,667	Producing
Westmoreland..........	Blairsville**	Kahl	10/23/62	10,083,099	313,802	10,396,901	Producing
	Latrobe**	Dry Ridge	8/25/46	5,583,196	79,521	5,662,717	Producing
	Jacobs Creek**	Bailey	12/26/61	1,901,633	1,349	1,902,932	Producing
	Lycippus	*TOTAL*	8/17/49	6,483,031	48,335	6,531,366	Producing & abandoned
		St. Boniface Chapel	9/13/56	5,743,603	48,335	5,791,938	Producing
	Murrysville**	*TOTAL*	11/ 3/1878	687,677	22,225	709,092	Producing & abandoned
		Duquesne	8/ 8/65	558,750	22,225	580,975	Producing
Westmoreland & Somerset............	Johnstown	*TOTAL*	5/16/57	27,949,820	604,546	28,554,366	Producing & abandoned
		Baldwin	5/22/60	10,145,563	313,970	10,459,533	Producing & abandoned
		Beck	5/16/57				
		Williams	2/14/58	17,804,257	290,576	18,094,833	Producing
	Seven Springs	*TOTAL*	12/15/58	7,466,250	97,132	7,563,382	Producing & abandoned
		Blair	12/ 5/58	6,085,776	76,988	6,162,764	Producing
		Tunnel	3/10/65				
		Seven Springs	8/ 3/66	668,051	20,144	688,195	Producing

*Mcf=thousand cubic feet
**"Shallow" (Upper Devonian and younger) gas production of field not shown
***Correction

DRILLING AND COMPLETION COSTS

The costs of drilling and completing wells are conventionally given in dollars per foot. These costs vary with depth of drilling and increase very rapidly as wells penetrate below the usual drilling depths in a given area. A dry hole will normally be far cheaper than a completed producing well of the same depth because there are no completion costs. An "ultra deep" exploratory well, even though completed as a dry hole, will commonly be extremely expensive in terms of costs per foot due to provision for problems not usually encountered in shallower holes or in areas of well-understood subsurface geology. In Pennsylvania, where shallow drilling is the rule (average depth per well in 1977 was 2,368 feet), a well below about 5,000 feet is considered moderately deep, and below about 9,000 feet ultra deep.

Due to widely varying conditions, even in the same area, and inflationary increases in cost of such items as steel well casing, only very approximate cost estimates can be given.

1. Venango County, shallow oil well, about 900 feet deep. Dry hole*, about $9 per foot. Completion, about $11-$13 per foot.
2. McKean County, shallow oil well, about 1,800 feet deep. Dry hole*, about $9 per foot. Completion, about $17 per foot.
3. Indiana County area, shallow gas well, about 3,000-4,000 feet deep. Dry hole*, about $10 per foot. Completion, about $27-$30 per foot.
4. Elk-Forest County, deep exploratory hole penetrating below Silurian salt section, 6,500 feet to 7,800 feet deep. Dry hole*, about $30 per foot.
5. Jefferson-Indiana-Clearfield County area, deep "Oriskany" gas well, 7,500 feet deep. Dry hole*, $16-$18.50 per foot. Completion, $24-$27 per foot.
6. Somerset-Fayette County, deep "Oriskany" gas well, 9,000 feet deep. Dry hole*, $17.50-$26.50 per foot. Completion, $25-$33 per foot.
7. Crawford County, deep gas well producing from Lower Silurian, 4,000 feet deep. Completion, about $34 per foot.
8. North-central counties, "ultra deep" wildcat, about 11,000 feet, penetrating below Silurian salt section. Dry hole*, $35-$40 per foot.

* No attempt at completion

OTHER ACTIVITIES RELATED TO OIL AND GAS DEVELOPMENTS

GEOPHYSICAL ACTIVITY

The principal non-drilling exploratory tool used in Pennsylvania is the exploration seismograph, which can give approximate to excellent indications of the attitude of the rocks at depth by measuring the time of travel of vibrations to and from the surface. The principal technique now in use in Pennsylvania is Vibroseis (trademark of Continental Oil Company, Conoco); in this technique, seismic pulses are generated at the surface by mechanical means, rather than by using explosives in very shallow drill holes. The work is usually done by contract crews, and the intensity of activity is gauged by the number of crew-months of operations. Seismic exploration was up from 9.2 crew-months in 1976 to 17.99 crew-months in 1977. Practically all crews used Vibroseis, and field costs were about $80,000 per crew-month, an aggregate cost for 1977 of about $1,440,000. Seismic surveys were reported in Bedford, Blair, Cambria, Centre, Columbia, Huntingdon, Juniata, Luzerne, Mifflin, Montour, and Union Counties. Seven seismic survey permits were issued by the Department of Environmental Resources for evaluation of State Forest lands in the Bald Eagle, Cornplanter, Lackawanna, Moshannon, Sproul, Tiadaghton, and Tuscarora State Forests in Centre, Clinton, Juniata, Lackawanna, Lycoming, Mifflin, Snyder, and Union Counties. The data indicate not only a doubling of activity, but also a definite shift south and east from former areas of interest.

ACTIVITIES ON STATE LANDS

At the end of 1977, there were 37 active oil and/or gas leases on Pennsylvania Game Commission lands. These totaled 35,593 acres, compared to 38 active leases as of the beginning of the year. There were 42 producing gas wells on 13 of the leases. The total production for 1977 from these wells was 283,422 thousand cubic feet of gas. One lease produced 40.84 barrels of oil.

In 1977, income from oil and gas activities on State Forest lands totaled $686,129. These monies were obtained from production royalties, gas storage and exploration acreage rentals, pipeline rights of way, and seismic permits. Of this total, royalty payments for the year amounted to $88,689 for 951,051 thousand cubic feet of gas. Included in the royalty total is $45,368 for 523,666 thousand cubic feet of gas, as advance payment for the remaining gas reserves located on State Forest lands in the Driftwood-Benezette gas storage field in Elk, Clearfield, and Cameron Counties. Rentals for existing wildcat (exploratory) acreage and past leasing programs totaled $166,600, whereas storage rentals were $417,492. Other income for pipeline rights of way, compressor station (location) rentals, and seismic surveys totaled $13,347.

During the year, the only additional commonwealth land placed under lease was from a sealed-bid lease sale in Sproul State Forest in Boggs, Curtin, and Snow Shoe Townships, Centre County. The commonwealth received a bonus bid of $25.56 per acre for 4,318 acres offered for lease for a total of $110,368.08.

At the end of the year, 208,935 acres of State Forest and Park lands were currently under lease for oil and gas exploration and development. This includes 99,762 acres in gas storage areas.

1977 OIL AND GAS EXPLORATORY AND DEVELOPMENT HIGHLIGHTS

The same wells reported under drilling and completions provided the data for the following classifications.

EXPLORATORY WELLS

An exploratory well is a well drilled to (1) find and produce oil or gas in an unproved area; (2) find a new reservoir in a field previously found to produce oil or gas in another reservoir; or (3) extend the limits of a known oil or gas reservoir. Exploratory wells include the following: new field wildcat, new pool wildcat, deeper pool test, shallower pool test, or outpost extension test. If the well is not completed for production, it is an exploratory dry hole. Exploratory drilling in 1977 (93 wells) was up 26 percent from 1976 (74 wells), and the success ratio was 53 percent (see Figure 18 for location of oil and gas fields).

DEVELOPMENT WELLS

In general, a development well is a well drilled within the proved area of an oil or gas reservoir to the depth of a stratigraphic horizon known to be productive. If the well is completed for production, it is classified as an oil or gas development well. If the well is not completed for production, it is classified as a dry development hole. Development drilling in 1977 was up 12 percent from 1976 and had a 95 percent success ratio.

Figure 20 shows both exploratory and development drilling for 1977 by type of well (oil, gas, etc.) and gives total footage.

Explanations for an exploratory and development well are modified from definitions used by the Committee on Statistics of Drilling of the American Petroleum Institute/American Association of Petroleum Geologists.

HIGHLIGHTS OF 1977 EXPLORATION

In 1977, the joint Amoco-UGI exploration program became more fruitful after a period of some discouragement. The Amoco #1 Ott opened the Shade Creek gas field and their #1 Yoder discovered the Heckman Hollow gas field (see Figures 21 and 22 for more detail). Both wells are new field wildcat discoveries in an area of Somerset County that has hitherto been little explored.

Figure 20. Exploratory and primary development and drilling footages reported, 1977 and 1976*

Type of well	*1977 Wells*	*1977 Footage*	*1976 Wells*	*1976 Footage*	*% Change in footage*
Exploratory					
Gas	47	172,894	33	160,771	
Oil	1	1,604	9	16,651	
Oil and gas	1	1,964	1	1,740	
Dry	44	172,464	31	109,956	
Total (% successful)	*93 (53%)*	*348,926*	*74 (58%)*	*289,118*	*+ 21*
Development					
Gas	647	2,311,367	532	1,808,419	
Oil	677	715,361	631	689,486	
Oil and gas	9	25,498	10	32,562	
Dry	28	51,164	15	35,470	
Total (% successful)	*1,361 (98%)*	*3,103,390*	*1,188 (99%)*	*2,565,937*	*+ 21*
Miscellaneous Wells					
Service and stratigraphic	8	9,489	49	75,312	*- 87*
TOTAL ALL WELLS DRILLED	*1,462 (95%)*	*3,461,805*	*1,311 (96%)*	*2,930,367*	*+ 18*

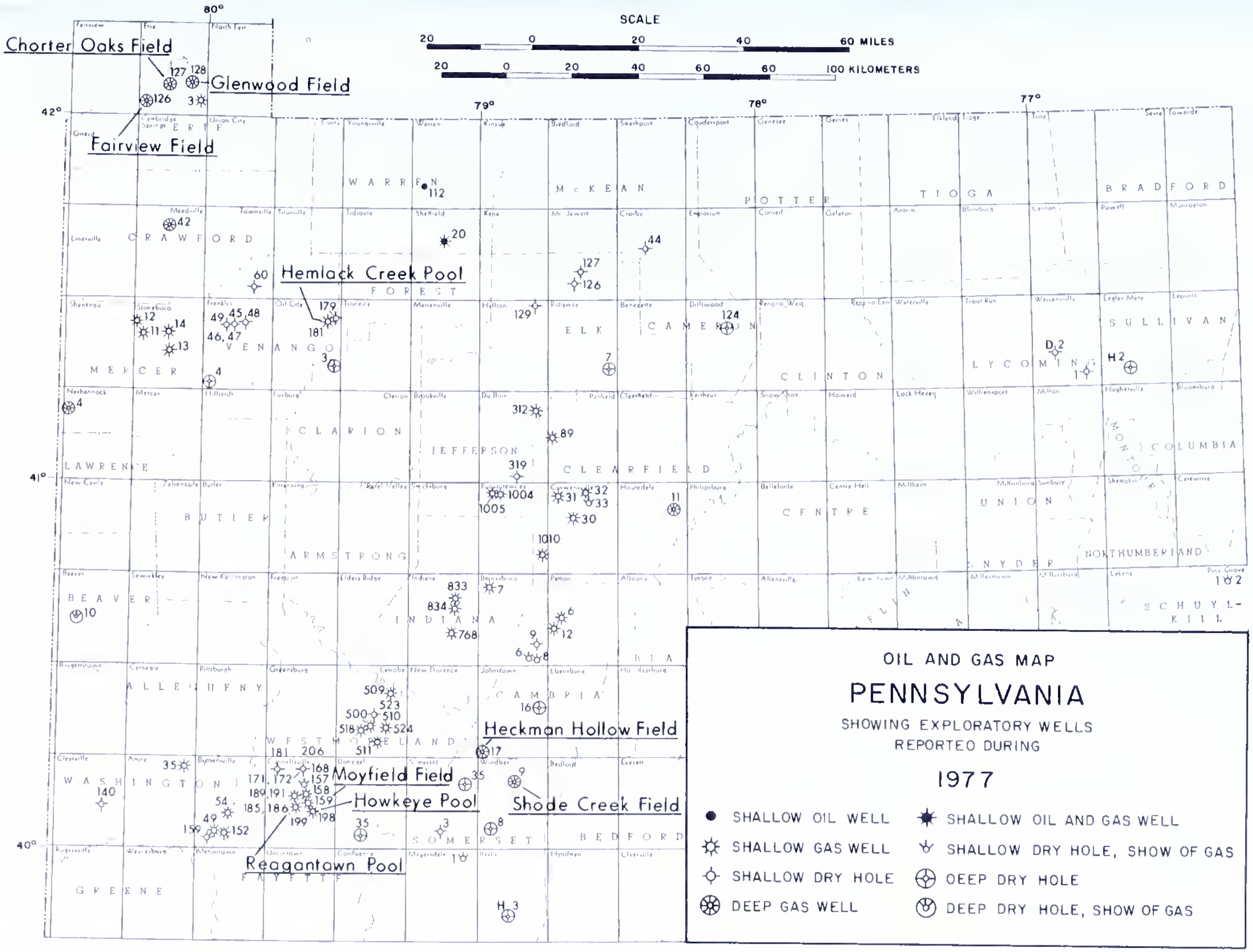


Figure 21. Map of exploratory wells in Pennsylvania reported in 1977 (Exploratory wells are wells drilled to find and produce oil or gas in an unproved area.)

Figure 22. Reported new field and new pool discoveries in Pennsylvania, 1977

Map no.	*County*	*Operator well no. and lease*	*Compl. date (M-Day-Y)*	*Total depth (feet)*	*Name of formation at T.D.*	*Prod. depth (feet)*	*Prod. formation or zone*	*Initial daily prod.*	*Field or pool name*	*Explor. class**
126	Erie	Automation Devices 1 Automation Devices	3/12/77	2,922	Queenston (O)**	2,891	Medina (S)	330 Mcf	Fairview Field	NFD
127	Erie	Warren Steel Products 1 Warren Steel	5/19/77	2,863	Queenston (O)	2,790	Medina (S)	516 Mcf	Charter Oaks Field	NFD
128	Erie	Synthane-Taylor 1 Haysite Division	8/ 9/77	3,102	Queenston (O)	3,086	Medina (S)	2,116 Mcf	Glenwood Field	NFD
312	Jefferson	C. L. Mann 1 Falls Creek Stone & Sand	5/ 3/77	3,400	Canadaway (D)	2,448	Bradford (D)	80 Mcf	Unnamed***	NFD
9	Somerset	Amoco-UGI 1 Lester W. Ott	10/ 3/77	8,895	Ridgeley (D)	8,726	Ridgeley (D)	1,250 Mcf	Shade Creek Field	NFD
17	Somerset	Amoco-UGI 1 David W. Yoder	8/16/77	9,067	Helderberg (D)	8,787	Ridgeley (D)	1,300 Mcf	Heckman Hollow Field	NFD
151	Venango	Quaker State Oil Refining 70 President Oil #2	6/25/76	1,043	Venango (D)	1,043	Venango (D)	134 Mcf	Hemlock Creek Pool	NPD
159	Westmoreland	Louden Properties 761-1 F. N. Stoner	4/ 8/77	4,180	Canadaway (D)	3,789	Canadaway (D)	396 Mcf	Mayfield Field	NFD
198	Westmoreland	Louden Properties 429-1 M. K. Komenda	9/ 4/77	4,210	Bradford (D)	3,653	Bradford First (D)	581 Mcf	Hawkeye Pool	NPD
199	Westmoreland	Louden Properties 430-1 A. W. Cressman	9/29/77	4,022	Bradford (D)	3,765	Bradford First (D)	839 Mcf	Reagantown Pool	NPD

*NFD=new field discovery; NPD=new pool discovery
**(O)=Ordovician; (S)=Silurian; (D)=Devonian
***Non-commercial well

The most significant discovery of 1977 was not reported officially, because the discovery well, which commenced drilling July 17, 1977, was an incomplete tight hole at the year's end. This well is the Amoco-UGI #1 Texasgulf, Inc. Tract located about 8 miles northwest of Bellefonte, in the Snow Shoe quadrangle, Boggs Township, north-central Centre County. The well gauged a visually estimated flow of 20 million cubic feet of gas per day from the Lower Silurian Tuscarora Sandstone at 10,760 feet. It is 27 miles south of the Leidy gas storage field, which originally produced from the Lower Devonian Ridgeley ("Oriskany") Sandstone, and 110 miles south-southeast of the Irwin gas pool in Venango County, the nearest Silurian production. At the time of writing, a one-half mile southwest stepout confirmation (Amoco #2 Texasgulf, Inc. Tract) was being drilled.

The location of the Amoco Texasgulf discovery on one of the major anticlinal structures that extend along the eastern edge of the Allegheny Plateau and the strong geologic similarity to a series of major discoveries on the eastern edge of the Rocky Mountains aroused strong interest in a widespread area of the Appalachians. In Pennsylvania, it triggered an extensive leasing and geophysical exploration campaign up and down the Allegheny Front from the New York border to the southern line of Bedford County. It is estimated that roughly 500,000 acres have already been leased along this alignment.

Because a large portion of the area around the Texasgulf project is public land, considerable acreage of state land is expected to be involved in this area of interest. This may amount to as much as 300,000 acres of State Forest lands and 150,000 acres of State Game lands.

Medina (Lower Silurian) Sandstone gas development in northwestern Pennsylvania continued during the year with local stepouts and some good completions in areas previously considered marginally commercial. Industries in the area are showing increasing interest in drilling on their own properties for supplemental gas supplies. Thus, Fairview field was discovered by Automation Devices, Charter Oaks field by Warren Steel Products, and Glenwood field by the Haysite Division of Synthane-Taylor. All are in Erie County.

Research funded by the U.S. Department of Energy and interest by private parties in the Eastern Gas Shales Program continue high. A few new shallow wells that tested the shale reservoirs from 800 feet to 1,200 feet below the surface were drilled in the Pennsylvania portion of the area marginal to Lake Erie which extends from Dunkirk, New York, to Sandusky, Ohio. This area produced substantial amounts of gas from very shallow gas shale reservoirs as much as a century ago.

Figures 21, 22, and 23 include a map showing the 1977 exploratory effort, a table showing all 1977 new field and new pool discoveries, and a table showing selected exploratory failures.

Figure 23. Selected exploratory failures reported in Pennsylvania, 1977

Map no.	*County*	*Operator well no. and lease*	*Compl. date (M-Day-Y)*	*Total depth (feet)*	*Name of formation at T.D.*	*Explor. class**
10	Beaver	St. Joe Petroleum Corp. 1 Richard J. Ashcroft	12/ 6/75	7,519	Queenston (S)**	NFW
3	Clarion	Peoples Natural Gas Company 2 United Natural Gas Company	10/15/77	6,780	Rochester (S)	NFW
7	Elk	Flint Oil and Gas, Inc. 1 J. W. Minteer	1/17/77	7,177	Syracuse Salt (S)	NFW
H 2	Lycoming	UGI Development Company 1 Chester G. Shaner	6/26/77	7,836	Keyser (S-D)	NFW
1	Lycoming	Pennsylvania Energy Resources 1 Bruce Woodley	3/ 4/77	1,706	Chemung (D)	NFW
D 2	Lycoming	Pennsylvania Energy Resources 2 Horace Yeagle	7/15/77	2,274	Catskill (D)	NFW
1	Schuylkill	U. S. Bureau of Mines 1 Bretzius Improvement Tract	8/26/75	1,948	Llewellyn (P)	NFW
2	Schuylkill	U. S. Bureau of Mines 2 Bretzius Improvement Tract	10/22/75	2,350	Pottsville (P)	NFW
H 3	Somerset	Amoco-UGI Development Company 1 Harry F. Ludy, et ux	5/19/77	4,210	Hamilton (D)	NFW

*NFW=new field wildcat
**(S)=Silurian; (S-D)=Silurian-Devonian; (D)=Devonian; (P)=Pennsylvanian

PROJECTS IN PROGRESS IN 1977, OIL AND GAS GEOLOGY DIVISION, BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY

OIL AND GAS BASE MAP PROGRAM

Twenty-six base maps showing location of oil and gas wells and the outline of oil, gas, and gas storage fields are available (see Figure 24 for index map of area covered). Each base map encompasses four 15-minute topographic quadrangles at a scale of 1:62,500 (one inch equals approximately one mile). A 5-minute grid, quadrangle names, county boundaries, and major rivers and towns make the background of the base maps. All known deep wells (wells that penetrated Middle Devonian or deeper rocks) and those shallow wells (wells not reaching Middle Devonian) on record with the Survey are located. Status (dry, oil, gas, etc.) of each, and elevation and to-

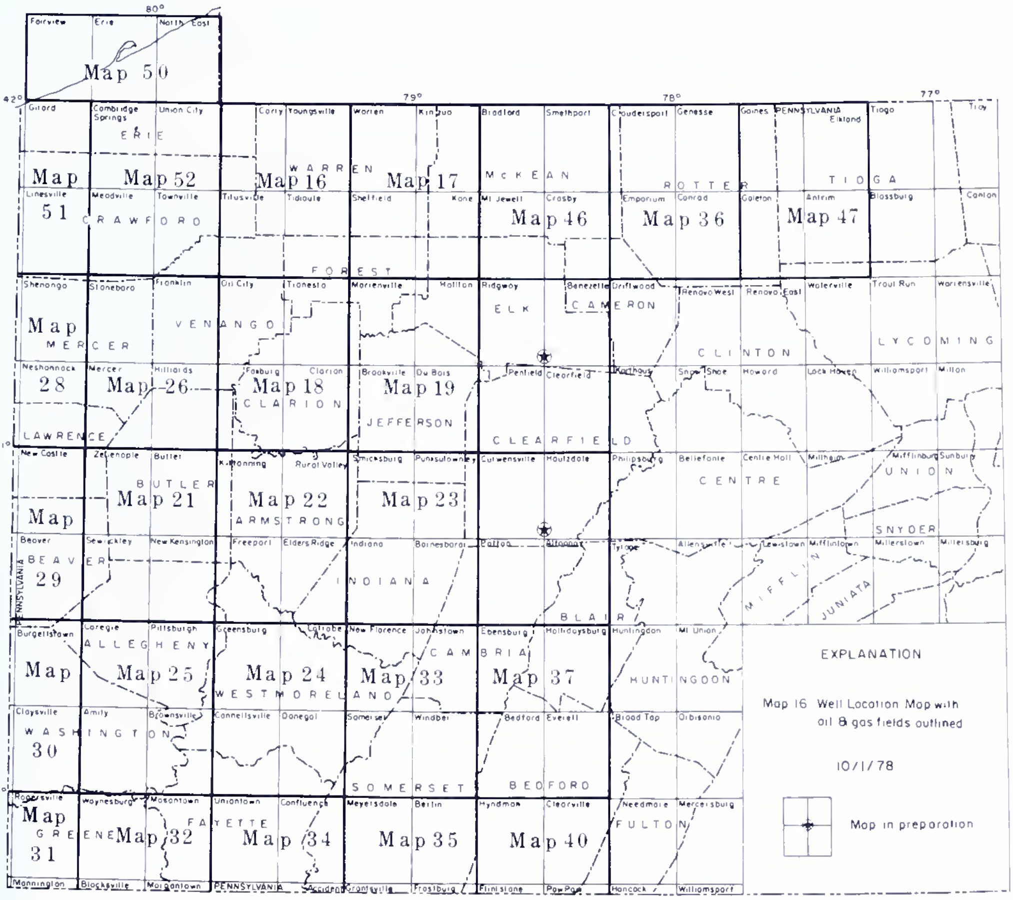


Figure 24. Index of available subsurface base maps

tal depth of many are shown. Symbols indicate whether borehole geophysical log and sample data are on file in the Survey's Oil and Gas Geology Division office in Pittsburgh. An index map near the legend shows the outlines of oil, gas, and gas storage fields within the mapped area, thus indicating the extent of areas of pre-1956 drilling. A listing of field names is also included.

Maps 50, 51, and 52 (see Figure 24) are completed. The remaining 23 currently available maps are being updated. All 26 probably will be available in current status by October 1978.

Paper prints of the base maps can be obtained by writing to the State Book Store, P. O. Box 1365, Harrisburg, Pennsylvania 17125. The cost of each base map is $0.50, plus a 6 percent sales tax to Pennsylvania residents. A check for the appropriate total amount, made payable to the Commonwealth of Pennsylvania, must accompany the order. When ordering, please specify the map number.

A cross index of state permit numbers with quadrangle map numbers used on the base maps is available from the Oil and Gas Geology Division of the Pennsylvania Geological Survey, 1201 Kossman Building, 100 Forbes Avenue, Pittsburgh, Pennsylvania 15222. This index is arranged by quadrangles. Please specify the quadrangle when requesting this literature. Base maps are updated every year.

OTHER PROJECTS IN PROGRESS

Subsurface stratigraphy and hydrocarbon potential of the Devonian organic-rich shales of Pennsylvania, by Robert G. Piotrowski and John A. Harper (a cooperative project with the U. S. Department of Energy). See Progress Report 190.

Map of the subcrop beneath the Onondaga-Huntersville-Bois Blanc Formations in the subsurface of Pennsylvania, by Louis Heyman.

The Lower Devonian Ridgeley Formation in the subsurface of Pennsylvania, by Louis Heyman.

Subsurface structure of the Plateau region of north-central and western Pennsylvania, by Louis Heyman.

Sixteen year review of deep well summary, by Louis Heyman and Cheryl L. Cozart.

OIL AND GAS GEOLOGY REPORTS ISSUED IN 1977

Map 3, 1977 edition, *Oil and gas fields of Pennsylvania,* by William S. Lytle and Lajos J. Balogh, scale 1:250,000; on reverse side are maps of natural gas and oil pipelines of Pennsylvania, scale 1:500,000.

Mineral Resource Report 70, *Oil fields of the Greater Pittsburgh Region,* by William S. Lytle.

Mineral Resource Report 73, *Tully (Middle Devonian) to Queenston (Upper Ordovician) correlations in the subsurface of western Pennsylvania,* by Louis Heyman.

Progress Report 190, *Oil and gas developments in Pennsylvania in 1976,* by William S. Lytle, Louis Heyman, Robert G. Piotrowski, and Stephen A. Krajewski.

Although not an Oil and Gas Geology publication, the following Pennsylvania Geological Survey Atlas should be of considerable interest. It includes the area of the Salladasburg gas field, the easternmost Lower Devonian Ridgeley ("Oriskany") Sandstone production in the central part of the state.

Atlas 133cd, *Geology and mineral resources of the Salladasburg and Cogan Station quadrangles, Lycoming County, Pennsylvania,* by Rodger T. Faill, Richard B. Wells, and W. D. Sevon.

SUMMARIZED RECORDS OF REPORTED DEEP WELLS IN 1977 THAT PENETRATED ROCKS OF MIDDLE DEVONIAN OR OLDER AGE

The information in Figure 25 has been compiled mainly from drillers' logs and location plats received from the Oil and Gas Division of the Bureau of Land Protection and Reclamation, Department of Environmental Resources. Other sources are Petroleum Information Corporation (PI), geophysical logs received by the Pennsylvania Geological Survey, and personal communications with oil and gas operators. Wells are filed with the Bureau of Land Protection and Reclamation by permit numbers. The Pennsylvania Geological Survey assigns a file number which appears on our published and open-file maps.

A single asterisk appearing on a record indicates that all formation tops and total depths were picked from a geophysical log. A record without an asterisk means that the formation tops and total depths are from the driller's log or PI. Where a double asterisk appears, the 7½-minute quadrangle name and location are given. These tables are listed alphabetically by county and by name of well.

Figure 25. Summarized records of reported deep wells in 1977 that penetrated rocks of Middle Devonian or older age

MAP NUMBER										
COUNTY Permit Number	Beaver 20060	Cambria 20050	Cameron 20062	Clarion 20672	Clearfield 20620	Clearfield 20634	Clearfield 20654	Crawford 20515	Crawford 20513	Crawford 20517
NAME OF WELL	Richard J. Ashcroft #1	Rupert Shrift #2	PA Department Environmental Resources #1	United Natural Gas #2	General Refractories Company #2	Harbison-Walker Refractories #1	Thomas E. H. Reitz #1	Ernest & E. A. Dunton #1	Richard & R. Eells #1	Hughson Chemicals #1
OPERATOR	St. Joe Petroleum Corp.	Peoples Natural Gas Company	Consolidated Gas Supply Corp.	Peoples Natural Gas Company	John H. Ware, 3rd	Amoco Production Company	Consolidated Gas Supply Corp.	Flanigan Brothers	Flanigan Brothers	Venango Petroleum Corporation
TOWNSHIP	Greene	Croyle	Grove	Ashland	Boggs	Boggs	Brady	Cussewago	Cussewago	Saegerstown Boro
QUADRANGLE	Beaver D 10	Johnstown F 16	Driftwood B 124	Oil City F 3	Houtzdale C 11	Houtzdale C 10	Curwensville A 6	Cambridge Springs G 36	Cambridge Springs G 36	Meadville B 42
LATITUDE	23,800 ft. S 40°40'	2,650 ft. S 40°25'	22,200 ft. S 41°30'	1,760 ft. S 41°20'	28,450 ft. S 41°00'	25,150 ft. S 41°00'	1,050 ft. S 41°00'	22,850 ft. S 41°50'	17,900 ft. S 41°50'	13,800 ft. S 41°45'
LONGITUDE	4,800 ft. W 80°25'	5,850 ft. W 78°45'	2,325 ft. W 78°05'	8,310 ft. W 79°30'	14,600 ft. W 78°15'	19,950 ft. W 78°15'	13,200 ft. W 78°40'	17,400 ft. W 80°10'	18,400 ft. W 80°10'	15,150 ft. W 80°05'
DATE COMPLETED	12-6-75	2-8-77	8-26-76	10-15-77	4-1-77	6-10-77	8-8-77	10-20-76	10-31-76	11-5-76
ELEVATION	1130 KB	2279 KB	2103 KB	1635 GR	1864 KB	1991 GR	2002 KB	1140 GR	1144 KB	1118 KB
TULLY		*8112-	*5813- Gas	*4892-	*7056-7122	*7004-	*6750-6922			*2550-2620
ONONDAGA LIMESTONE	*5056-	9041-	6505-6525	5198-	8012-	7928-	7486-7498	2535-2720	2486-2680	2742-2932
ONONDAGA CHERT		9066- SSGas					7498-7563			
ORISKANY	5244-5318	9152-	6525-6602		8073- SG @8035-78	7994- Gas @7994-8000	7563-7568 Gas @7502-7593	2720-2725	2680-2690	Absent
HELDERBERG	5318-	9198-	6602-	5254-		8000-	7568-	2725-3130	2690-2950	Absent
KEYSER-BASS ISLAND	5460-			5388-						
SALINA	5620-			5430-				3130-3470	2950-3410	2932-3700
GUELPH-LOCKPORT	6755-			6348-				3470-3765	3410-3645	3700-3925
BLACK WATER										
CLINTON	7065-			6684-				3765-	3645-	3925-
IRONDEQUOIT	7230-							3784-	3726-	4020-
MEDINA	7334-							3840-3960 Gas @3886-3956 3994-4000	3800-3886 Gas @3814-3882 3932-3938	4055-4195 Gas @4112-95; 4238 4235-4250
WHIRLPOOL										
QUEENSTON	7502-							4000-	3938-	4250-
TOTAL DEPTH	7519	9226	6608	6780	8093	8082	7593	4065	4002	4281
DEEPEST FORMATION REACHED	Queenston	Helderberg	Helderberg	Clinton	Helderberg	Helderberg	Helderberg	Queenston	Queenston	Queenston
RESULT	Slight Show Gas Well suspended, awaiting further production tests. New Field Wildcat	Slight Show Gas Abandoned Deeper Pool Test South Fork Field	Slight Show Gas Abandoned New Field Wildcat	Dry Abandoned New Field Wildcat	300 Mcf AF 3,900 psi/30 days West Decatur Field Extension	473 Mcf Nat. 36 psi/1.5 days 1,000 Mcf AF 2,933 psi/52 hrs. West Decatur Field	267 Mcf AF 2,250 psi/48 hrs. Development Anderson Creek Pool	250 Mcf AF 1,190 psi/48 hrs. Development Indian Springs Pool	250 Mcf AF 1,190 psi/48 hrs. Development Indian Springs Pool	265 Mcf AF 1,300 psi/7 days Extension Kastle Pool

MAP NUMBER										
COUNTY Permit Number	Crawford 20511	Crawford 20502	Crawford 20509	Crawford 20514	Crawford 20516	Crawford 20512	Elk 20383	Erie 20428	Erie 20436	Erie 20451
NAME OF WELL	Miller E. Jamison #3	Neil O. Maloney #1	Clarence J. McGee #1	Schlosser #3	Schmidt #4	Helen Webb #4	J. W. Minteer #1	John Archer #1	John Archer #2	John Archer #3
OPERATOR	Meridian Oil and Gas Enterprises, Inc.	Van Raalte Oil Company	Meridian Oil and Gas Enterprises, Inc.	Flanigan Brothers	Flanigan Brothers	Meridian Oil and Gas Enterprises, Inc.	Flint Oil and Gas Company	Envirogas, Inc.	Envirogas, Inc.	Envirogas, Inc.
TOWNSHIP	Summerhill	Venango	Summerhill	Cussewago	Cussewago	Summerhill	Jay	North East	North East	North East
QUADRANGLE	Girard A 464 **Conneautville	Cambridge Springs H 35	Linesville C 63	Cambridge Springs G 37	Cambridge Springs G 39	Linesville C 65	Ridgway I 7	North East B 42	North East B 43	North East B 46
LATITUDE	15,100 ft. S 41°47'30"	11,450 ft. S 41°50'	7,100 ft. S 41°45'	21,150 ft. S 41°50'	20,450 ft. S 41°50'	4,300 ft. S 41°45'	9,350 ft. S 41°20'	12,900 ft. S 42°15'	12,050 ft. S 42°15'	5,400 ft. S 42°15'
LONGITUDE	8,000 ft. W 80°17'30"	2,050 ft. W 80°05'	20,700 ft. W 80°15'	19,800 ft. W 80°10'	17,700 ft. W 80°10'	20,050 ft. W 80°15'	4,400 ft. W 78°30'	19,600 ft. W 79°50'	17,900 ft. W 79°50'	2,400 ft. W 79°50'
DATE COMPLETED	10-27-76	3-20-76	11-11-76	10-26-76	10-15-76	11-11-76	1-17-77	7-22-77	8-5-77	10-28-77
ELEVATION	1312 KB	1190 KB	1291 KB	1131 KB	1143 KB	1312 KB	1769 KB	680 GR	680 GR	604 DF
TULLY		*2456-2530					*6132-6228			
ONONDAGA LIMESTONE	2680-	2661-2819	*2696-	2502-	2502-	*2691-	6738-6800			
ONONDAGA CHERT										
ORISKANY	Reported @2840	Bois Blanc 2819-2860		2695-	2690-	Absent	6800-6821			
HELDERBERG							6821-			
KEYSER-BASS ISLAND		2860-2925		2700-	2695-	2900-	6920-			
SALINA		2925-		3105-	3100-		7035-			
GUELPH-LOCKPORT	3585-	3505-	3616-3850	3450-3640	3420-3640	3604-		1994-	2000-	1922-
BLACK WATER		3692-Newhurg								
CLINTON		3790-	3850-	3640-	3640-			2196-	2207-	2133-
IRONDEQUOIT	3922-	3872-	3950-	3736-	3743-	3944-		2302-	2310-	2230-
MEDINA	3944-Gas & Oil	3898- Gas @3941-3990	3983- Gas @4036-4086	3840- Gas @3840-3885	3810- Gas @3852-3919	3971- Oil & Gas @4056-78		2318- Gas @2330-2491	2327- Gas @2388-2496	2250- Gas @2285-2419
WHIRLPOOL	4135-4144	4078-4088	4169-	3940-3946	3956-3962	4159-4165		2474-	2482-	2402-
QUEENSTON	[illegible]44-	4088-	4230-	3946-	3962-	4165-		2494-	2499-	2422-
TOTAL DEPTH	4196	4116	4233	4002	3998	4214	7177	2654	2584	2483
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Salina	Queenston	Queenston	Queenston
RESULT	100 Mcf AF 1,025 psi/24 hrs. 20 BO AF 1,025 psi/3 days Development Indian Springs Pool	800 Mcf AF 1,120 psi/48 hrs. Development Cambridge Springs Field	100 Mcf AF 1,075 psi/3 days 20 BO AF 1,040 psi/24 hrs. Development Indian Springs Pool	500 Mcf AF 1,190 psi/48 hrs. Development Indian Springs Pool	300 Mcf AF 1,195 psi/48 hrs. Development Indian Springs Pool	100 Mcf AF 975 psi/24 hrs. 20 BO AF 1,070 psi/3 days Development Indian Springs Pool	Small Upper Devonian gas show at 2530 feet Abandoned New Field Wildcat	662 Mcf AF 770 psi/3 days Development Burgess Field	600 Mcf AF 800 psi/4 days Development Burgess Field	1,090 Mcf AF 686 psi/3 days Development Orchard Beach Pool North East Field

Figure 25. (Continued)

MAP NUMBER											
COUNTY Permit Number		Erie 20406	Erie 20415	Erie 20416	Erie 20437	Erie 20419	Erie 20407	Erie 20421	Erie 20454	Erie 20438	Erie 20413
NAME OF WELL		Automation Devices #1	Norbert & Nancy Cross #1	Norbert & Nancy Cross #2	General Electric #1	Haysite Division #1	Robert E. & Helen Huston #1	Howard & Verona Loftus #1	William & Phillip McCord #1	Ross H. Peters #1	William Schultz #1
OPERATOR		Automation Devices, Inc.	Cross & Company	Cross & Company	General Electric Company	Haysite Division, Synthane-Taylor Corporation	Centron Oil & Gas Corporation	Eralco Natural Gas Development	Envirogas, Inc.	Envirogas, Inc.	Electric Materials Company
TOWNSHIP		Fairview	Waterford	LeBoeuf	Lawrence Park	Millcreek	Conneaut	Conneaut	North East	Harborcreek	North East
QUADRANGLE		Erie G 126	Union City B 14	Union City D 14	Erie F 129	Erie F 128	Girard D 462 **E. Springfield	Girard D 465 **E. Springfield	North East B 47	North East A 44	North East C 39
LATITUDE		15,150 ft. S 42°05'	29,000 ft. S 42°00'	50 ft. S 41°55'	10,000 ft. S 42°10'	30,000 ft. S 42°10'	9,500 ft. S 41°55'00"	11,200 ft. S 41°55'00"	8,900 ft. S 42°15'	26,250 ft. S 42°15'	7,350 ft. S 42°15'
LONGITUDE		20,900 ft. W 80°10'	4,400 ft. W 79°55'	4,100 ft. W 79°55'	9,100 ft. W 80°00'	15,500 ft. W 80°00'	9,100 ft. W 80°27'30"	1,950 ft. W 80°27'30"	13,100 ft. S 79°50'	11,050 ft. W 79°55'	13,900 ft. W 79°45'
DATE COMPLETED		3-12-77	5-4-77	5-24-77	8-30-77	8-9-77	2-21-77	7-3-77	10-25-77	10-20-77	5-18-77
ELEVATION		806 DF	1240 GR	1255 GR	700 GR	960 GR	910 GR	935 GR	710 GR	660 GR	835 KB
TULLY		*1346-	2290-	2300-	*1208-1300	*1580-1640		*1750-			*1296-1364
ONONDAGA	LIMESTONE	1570-	2519-	2526-	1406-	1798-	*1870-	1910-	?1328-	1360-	1524-
	CHERT										
ORISKANY		1854-1866	Absent	Absent		2044-?	2136-	Absent			
HELDERBERG		1866-	Absent	Absent		Absent	Absent	Absent			
KEYSER-BASS ISLAND SALINA		 1975-	2768- 2882-	2766- 2886-		2064-	2142- 2214-	2182- 2242-			1761-
GUELPH-LOCKPORT BLACK WATER		2390-	3372-	2800-	2163-	2580-	2748-	2800-	*2018-	*2066-	2212-
CLINTON IRONDEQUOIT		2615- 2695-	3600- 3707-	3605- 3715-	2384-	2820-	3000- 3082-	3034- 3138-	2230- 2328-	2276- 2375-	2473- 2523-
MEDINA WHIRLPOOL		2706- 2886-	3738- Gas @3798-3865 3902-	3745- Gas @3808-54; 3916 3912-	2470- Gas @2507-2598 -2650	2894-3088 Gas @2948-3086	3110- Gas @3128-3217 3282-	3167- Gas @3182-3248 3336-	2344- Gas @2382-2506 2500-	2390- Gas @2420-2562 2550-	2580- Gas @2613-2707 2692-
QUEENSTON		2894-	3914-	3925-	2650-	3088-	3287-	3343-	2518-	2563-	2710-
TOTAL DEPTH		2922	3956	3964	2704	3102	3312	3388	2605	2633	2779
DEEPEST FORMATION REACHED		Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston
RESULT		330 Mcf AF 630 psi/48 hrs. Discovery Fairview Field	1,900 Mcf AF 1,120 psi/7 days Development Erie Deep Field	2,500 Mcf AF 1,125 psi/7 days Development Erie Deep Field	70 Mcf AF 740 psi/2 days Development Erie Deep Field	2,116 Mcf AF 960 psi/89 hrs. Discovery Glenwood Field	740 Mcf AF 850 psi/2 days Development Bushnell-Lexington Pool Conneaut Field	1,200 Mcf AF 985 psi/2 days Development Bushnell-Lexington Pool Conneaut Field	630 Mcf AF 736 psi/4 days Development Orchard Beach Pool North East Field	562 Mcf AF 704 psi/3 days Development Erie Deep Field	400 Mcf AF 800 psi/48 hrs. Development Orchard Beach Pool

MAP NUMBER										
COUNTY Permit Number	Erie 20414	Erie 20422	Erie 20439	Erie 20408	Erie 20409	Erie 20412	Erie 20426	Erie 20411	Erie 20405	Fayette 20169
NAME OF WELL	William Schultz, et ux #2	Thomas Sherman #1	Marg. B. Southwick #1	Norman W. & Mary Taylor #2	Troyer #1	Troyer #2	Charles L. Valone #1	Warren Steel Products #1	Welch Foods, Inc. #3	John Barger, Jr. #1
OPERATOR	Electric Materials Company	Northwest Natural Gas Company	Envirogas, Inc.	Centron Oil & Gas Corporation	C & C Troyer Brothers	C & C Troyer Brothers	Envirogas, Inc.	Warren Steel Products, Inc.	Welch Foods, Inc.	Peoples Natural Gas Company
TOWNSHIP	North East	Conneaut	North East	Conneaut	Waterford	Waterford	North East	Millcreek	North East	Saltlick
QUADRANGLE	North East C 40	Girard E 466 **E. Springfield	North East C 45	Girard O 463 **E. Springfield	Union City A 11	Union City A 12	North East B 41	Erie E 127	North East B 38	Donegal G 35
LATITUDE	10,500 ft. S 42°15'	1,100 ft. S 41°55'00"	3,000 ft. S 42°15'	13,200 ft. S 41°55'00"	26,400 ft. S 42°00'	28,300 ft. S 42°00'	20,000 ft. S 42°15'	29,600 ft. S 42°10'	15,850 ft. S 42°15'	17,150 ft. S 40°05'
LONGITUDE	13,950 ft. W 79°45'	7,125 ft. W 80°22'30"	9,900 ft. W 79°45'	9,200 ft. W 80°27'30"	10,200 ft. W 79°55'	13,000 ft. W 79°55'	12,700 ft. W 79°50'	18,900 ft. W 80°05'	2,100 ft. W 79°50'	2,000 ft. W 79°25'
DATE COMPLETED	5-23-77	6-18-77	9-1-77	2-3-77	3-21-77	4-2-77	8-21-77	5-10-77	9-30-76	5-1-77
ELEVATION	894 KB	875 GR	730 GR	940 GR	1240 GR	1190 GR	790 GR	734 GR	797 GR	1901 DF
TULLY	*1360-1415	*1664-1686			*2205-	*2207-		*1316-1364	*1224-1271	*7160-7218
ONONDAGA LIMESTONE	1588-	1833-2100		*1906-	2426-	2428-		1520-1788		7746-
ONONDAGA CHERT										7766-
ORISKANY		Absent		2196-	Absent	Absent		1788-1808		7916-8072
HELDERBERG		Absent		Absent	Absent	Absent		Absent		8072-
KEYSER-BASS ISLAND	1830-	2100-		2204-	2680-	2482-		1818-		
SALINA		2160-		2248-	2806-	2809-				
GUELPH-LOCKPORT BLACK WATER	2277-	2712-	*2024-	2796-	3315-	3318-	*2180-			
CLINTON	2483-	2938-	2238-	3030-	3544-	3559-	2388-	2546-		
IRONDEQUOIT	2588-	3048-	2332-	3130-	3650-	3654-	2491-			
MEDINA	2646- Gas @2646-2768	3075- Gas @3108-3152	2349- Gas @2379-2477	3158- Gas @3177-3239	3680- Gas @3720-3768	3685- Gas @3749-3803	2509- Gas @2513-2678	2600- Gas @2647-2788		
WHIRLPOOL	2755-	3240-	2501-	3323-	3844-	3850-	2664-			
QUEENSTON	2772-	3248-	2519-	3332-	3855-	3860-	2680-	2792-		
TOTAL DEPTH	2834	3293	2605	3362	3907	3902	2758	2863	1271	8169
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Tully	Helderberg
RESULT	325 Mcf AF 740 psi/48 hrs. Development Orchard Beach Pool	750 Mcf AF 825 psi/24 hrs. Development Bushnell-Lexington Pool	1,272 Mcf AF 851 psi/3 days Development Orchard Beach Pool North East Field	780 Mcf AF 870 psi/2 days Development Bushnell-Lexington Pool Conneaut Field	250 Mcf AF 870 psi/24 hrs. Development Erie Deep Field	1,200 Mcf AF 895 psi/24 hrs. Development Erie Deep Field	600 Mcf AF 840 psi/4 days Development Burgess Field	516 Mcf AF 890 psi/72 hrs. New Field Discovery Charter Oaks Field	12 Mcf Nat. 150 Mcf AF 80 psi/48 hrs. Upper Devonian Shale Gas North East Field	No show oil/gas Dry & Abandoned New Field Wildcat

Figure 25. *(Continued)*

MAP NUMBER										
COUNTY Permit Number	Indiana 23520	Indiana 23638	Indiana 23504	Lycoming 20021	Lycoming 20020	Lycoming 20019	Mercer 20125	Mercer 20126	Mercer 20115	Mercer 20132
NAME OF WELL	Clearfield Bituminous Coal Corp. #6	Fenella Hatch Estate #1	Vincent Mihoerick #1	Robert M. Brucklacher #1	Charles N. Emig #1	Chester G. Shaner #1	Frank Burdett #6207	Orville L. Gadsby #6208	J. Rodgers #6201	Sawhill #1
OPERATOR	Felmont Oil Corporation	Felmont Oil Corporation	Felmont Oil Corporation	John H. Ware, 3rd	John H. Ware 3rd	UGI Development Company	National Fuel Gas Supply Corp.	National Fuel Gas Supply Corp.	National Fuel Gas Supply Corp.	Cyclops Corporation
TOWNSHIP	Pine	Pine	Pine	Mifflin	Mifflin	Penn	Worth	Worth	Worth	Wheatland
QUADRANGLE	Barnesboro E 37	Barnesboro G 38	Barnesboro E 36	Trout Run G 6	Trout Run G 5	Eagles Mere H 2	Stoneboro I 19	Stoneboro I 20	Stoneboro I 18	Neshannock A 4
LATITUDE	13,350 ft. S 40°40'	5,270 ft. S 40°35'	13,880 ft. S 40°40'	14,300 ft. S 41°20'	17,150 ft. S 41°20'	14,600 ft. S 41°20'	23,200 ft. S 41°20'	21,050 ft. S 41°20'	22,850 ft. S 41°20'	19,900 ft. S 41°15'
LONGITUDE	19,800 ft. W 78°50'	15,750 ft. W 78°55'	15,500 ft. W 78°50'	9,850 ft. W 77°10'	12,700 ft. W 77°10'	18,050 ft. W 76°35'	6,500 ft. W 80°00'	10,680 ft. W 80°00'	10,550 ft. W 80°00'	20,600 ft. W 80°25'
DATE COMPLETED	1-18-77	4-21-77	11-15-76	6-8-77	5-18-77	6-26-77	9-30-77	10-14-77	9-7-77	7-2-77
ELEVATION	1692 GR	1759 GR	1866 GR	733 GR	700 GR	978 GR	1494 GR	1466 GR	1394 KB	844 KB
TULLY	*7272-7298	*7347-7357	7343-7364	*4880-5035	*5095-	*5532-5768	*3965-4018	3893-3946	3805-	
ONONDAGA LIMESTONE	8027- Gas @8054-8095	8080- Gas @8105-8130	8117-	6139-6206	6312-6364	7304-	4169-	4093-4220	4001-4131	3218-3410
ONONDAGA CHERT	8045-	8095-	8133-							
ORISKANY	8146-	8200-	8234- Gas	6206- Gas @6220	6364- Gas @6380	7548-	Absent	Absent	Absent	3410-3418
HELDERBERG	8218-	8272-	8306-	6279-	6442-?	7674-	4305-	4220-4343	4131-4255	3418-3690
KEYSER-BASS ISLAND						7832-?	4425-	4343-4384	4255-4297	
SALINA							4468-	4384-5239	4297-5141	3690-4452
GUELPH-LOCKPORT							5239- Gas @5410-5440	5239- Gas @5428-5458	5141-5385 Gas @5327-5357	*4444-4704
BLACK WATER								5390-		
CLINTON							5485-	5486-	5385-5478	4704-4861
IRONDEQUOIT										4861-4898
MEDINA										4898-4950
WHIRLPOOL										Gas @4951-5064 5010-5104
QUEENSTON										5104-
TOTAL DEPTH	8275	8318	8350	6303	6462	7836	5950	6153	5478	5134
DEEPEST FORMATION REACHED	Oriskany	Oriskany	Helderberg	Helderberg	Helderberg	Keyser?	Clinton?	Clinton?	Clinton?	Queenston
RESULT	215 Mcf AF 3,490 psi/5 days Development Lizowitz Pool	2,381 Mcf AF 3,740 psi/10 hrs. Development Lizowitz Pool	200 Mcf AF 3,900 psi/48 hrs. Development Pineton Pool	50 Mcf Nat. 787 Mcf AF 3,850 psi/7 days Development Salladasburg Field	10-15 Mcf AF 2,300 psi/7 days Development Salladasburg Field Non-commercial	No show oil/gas Dry & Abandoned New Field Wildcat	200 Mcf Nat. RP Not Taken Plugged back to 5517. Development Kilgore Pool	217 Mcf Nat. RP Not Taken 25 Mcf AF 1,950 psi/14 days Plugged back to 5555. Development Kilgore Pool	217 Mcf Nat. RP Not Taken 86 Mcf AF 1,790 psi/5 days Plugged back to 5373. Development Kilgore Pool	600 Mcf AF 1,400 psi/3 days Wheatland Field Extension

MAP NUMBER											
COUNTY Permit Number		Mercer 20134	Somerset 20059	Somerset 20054	Somerset 20063	Somerset 20062	Somerset 20065	Somerset 20057	Venango 24837		
NAME OF WELL		Paul Treimer #1	Carl E. Brant, et ux #1	Harry F. Ludy, et ux #1	Merle M. Mostoller #1	Lester W. Ott #1	Howard Rose #1	David M. Yoder #1	Benton E. Schaeffer #1		
OPERATOR		Cyclops Corporation	Amoco Production Company	Amoco Production & UGI Development	Amoco Production Company	Amoco Production & UGI Development	Amoco Production & UGI Development	Amoco Production & UGI Development	Peoples Natural Gas Company		
TOWNSHIP		Shenango	Stonycreek	Northampton	Stonycreek	Paint	Jenner	Conemaugh	Irwin		
QUADRANGLE		Neshannock A 5	Windber G 7	Berlin H 3	Windber F 8	Windber B 9	Somerset C 35	Johnstown G 17	Franklin G 4		
LATITUDE		23,100 ft. S 41°15'	14,100 ft. S 40°05'	2,300 ft. S 39°50'	23,250 ft. S 40°05'	26,400 ft. S 40°15'	25,600 ft. S 40°15'	29,250 ft. S 40°20'	28,650 ft. S 41°20'		
LONGITUDE		21,400 ft. W 80°25'	5,650 ft. W 78°55'	14,500 ft. W 78°50'	11,250 ft. W 78°55'	9,650 ft. W 78°50'	9,200 ft. W 79°00'	21,600 ft. W 78°55'	18,250 ft. W 79°55'		
DATE COMPLETED		9-26-77	7-30-77	5-19-77	9-2-77	10-3-77	11-23-77	8-16-77	2-23-77		
ELEVATION		940 KB	2299 KB	2446 GR	2402 GR	2013 GR	1868 GR	1844 GR	1522 GR		
TULLY			?*7514-	?*3762-	7570-	*7658-7700	*7862-8620	*7869-	*4262-		
ONONDAGA	LIMESTONE	3329-	8733-				8690-8710	8644-	4486-		
	CHERT		8760-		8750-	8637-8725	8710-8805	8661-	4518-		
ORISKANY		3525-3540	8836-		8820-	8725- Gas @8726-8740	8805-8977	8763- Gas @8787-8829	Absent 4610-Shriver		
HELDERBERG		3540-3715	9010-		9030-		8977-	9067-	Absent		
KEYSER-BASS ISLAND		3715-3800							4660-		
SALINA		3800-4564							4786-		
GUELPH-LOCKPORT		4564-4840							5601-		
BLACK WATER									5758-		
CLINTON		4840-4981							5931-		
IRONDEQUOIT		4981-5020									
MEDINA		5020-							6225-?		
WHIRLPOOL		5216-							6400-		
QUEENSTON		5226-							6405-		
TOTAL DEPTH		5260	9044	4210	9169	8895	9006	9067	6519		
DEEPEST FORMATION REACHED		Queenston	Helderberg	Mahantango	Helderberg	Oriskany	Helderberg	Helderberg	Queenston		
RESULT		1,470 Mcf AF 1,380 psi/7 days Development Wheatland Field	Slight Show Gas Dry & Abandoned Shanksville Field	No show oil/gas Dry & Abandoned New Field Wildcat	No show oil/gas Dry & Abandoned Shanksville Outpost Extension	1,250 Mcf AF 3,350 psi/48 hrs. New Field Discovery Shade Creek Field	No show oil/gas Dry & Abandoned New Field Wildcat	1,300 Mcf AF 4,346 psi/26½ days New Field Discovery Heckman Hollow Field	Slight Show Gas Dry & Abandoned Extension Irwin Pool		